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# American Veterinary Medical Association

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AMERICAN VETERINARY REVIEW
(Original Official Organ U. S. Vet. Med. Ass'n)
EDITED AND PUBLISHED FOR
The American Veterinary Medical Association by Pierre A. Fish, Ithaca, N. Y.

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F. TORRANCE, J. R. MOHLER, R. A. ARCHIBALD

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**PIERRE A. FISH, Editor** **ITHACA, N. Y.**



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**Communications relating to membership and matters pertaining to the American Veterinary Medical Association itself should be addressed to Secretary L. A. Merillat, 1827 S. Wabash Ave., Chicago, Ill. Matters pertaining to the Journal should be sent to Ithaca, N. Y.**


*Enlist for the A. V. M. A. Mobilization at Kansas City, Mo., Aug. 20-24, 1917.*

## VETERINARY CONSERVATION

One of the important tests of efficiency facing veterinarians, in the mobilization of horses for army purposes, is safeguarding them against so-called "shipping fever". Past experience has shown that when large numbers of horses have been assembled from different sources and shipped to certain centers, outbreaks of this affection occur upon arrival or shortly afterwards. As preventive measures, in the first place, it is obvious that the horses should be sound in health before shipment; in the second place, transportation facilities should be adequate and complete enough to prevent exposure to undue heat or chill, or danger to infection from insanitary cars or pens. Open cattle cars, exposing the animals to mid-day heat and evening chill and inclement weather, have doubtless been a factor in augmenting the number of cases. Cars of this kind properly protected with canvas or closed cars properly ventilated and with a competent veterinarian as inspector during transportation would do much to avoid the difficulty. Such ad-

ditional expense as would be required in insuring these precautions would be a negligible factor as compared with the loss occasioned by the disease. In the third place is the matter of diagnosis. Under the term "shipping fever" or influenza are generally included cases of distemper or strangles and brustseuche or contagious pleuro-pneumonia, the one comparatively mild and the other of a serious nature. With differences in the period of incubation, degree of virulence and of severity, it is wise to separate the two classes of cases and adapt the treatment to conditions. With a large number of horses already purchased by the Allies, the conservation of those left for our own use is of the highest importance.

In the conservation of life, details which seem to be of a minor character are often of major importance. Soldiers wear uniforms of such a color that at a certain distance they seem to blend with the landscape so that they might be unperceived, as targets they are less conspicious. The same precautions should be taken with horses. In France experiments have already been made in dyeing the hair of the horses so that they shall be relatively inconspicuous. It is reported that experiments of a similar nature are under way in this country. Every detail that conserves life deserves most earnest consideration. Never before, in the history of this country, has there been so much need for conservation on the part of the civil and military veterinarians as the period that now confronts us.

If the conservation of animal life is not only desirable but necessary, is it not equally desirable and necessary to conserve human life and resources as affecting the veterinary profession? Our brother veterinarians of Belgium and Northern France have been ruthlessly driven from their homes, separated from their families in many instances, deprived of their possessions and compelled to face a future of hopeless misery unless aid can be furnished by which they may rehabilitate themselves when peace settles down upon these devastated areas. Belgium stood second to none in veterinary education and literature so far as quality is concerned. Her standards have been high and well has she lived up to them. She must be restored to them. Is it not to the interest of the world that the veterinary profession of Belgium should survive? Should not the veterinarians of America consider it an honor and privilege to contribute to this survival? The veterinary profession of unselfish France, bleeding from her war wounds has contributed $4,000. The veterinary profession of

England, staggering under her financial burdens, has contributed something over $600. The veterinary profession of rich America has thus far contributed something under $200. New York, Montana and Massachusetts are the only state associations represented up to the present. By conserving the veterinary profession of this stricken nation we are furthering the conservation of what our profession stands for.

In assuming our share of the burden of the war for humanity we must render all possible service to our allies. In our present situation we can more fully comprehend and appreciate Lincoln's statement: "Let us see to it that a government of the people, for the people, and by the people, shall not perish from the earth". Let us see to it that the remnants of the veterinary profession of Belgium and Northern France shall not disappear. Let us be participants in the great development that is to be. P. A. F.

## VETERINARY EFFICIENCY IN THE WAR

Along the line of veterinary activities the striking feature of the war is without a doubt the remarkable report that glanders is practically non-existent in the British artillery, cavalry and transport horses in France. It is a great achievement when it is considered that in the wars of the past glanders was considered the destructive scourge of horses, which on many occasions hampered effective movements of the armies. This feature alone is worthy of the highest commendation of the veterinary profession and speaks well for the thoroughness of the organization.

A convincing proof of the advance and progress of the veterinary profession is the fact that heretofore during the wars infectious diseases of animals were widely scattered among the warring nations, the control of which after the restoration of peace necessitated the most heroic efforts on the part of the authorities. Thus glanders, rinderpest, contagious pleuro-pneumonia, rabies and other scourges followed the wake of the armies. Attention might be directed to the last Balkan war of a few years ago when rinderpest was introduced into Bulgaria and Hungary causing great alarm in these countries.

With this great war, almost three years in progress, there is not the slightest indication that any of the countries are being threatened by the more dangerous forms of infectious diseases.

Aside from the slighter infections such as mange, influenza, strangles, etc., there is no evidence that any of the countries are being endangered by severe outbreaks.

The credit is due to the competence of the veterinary organization which being charged with the inauguration and enforcement of effective measures against such dangers, has admirably fulfilled all expectations.

The veterinary profession in the United States is now on the threshold of its greatest trial in which they will be called upon to give an account of themselves as never before in the history of our country and this is an opportunity which every member of our profession should take advantage of and do his share towards meriting the admiration and respect of our fellow citizens.

A. E.

## ARMY VETERINARY SERVICE*

In accordance with the National Defense Act of June 3, 1916, the Army Veterinary Service became a part of the Medical Department of the Army. No adequate provisions were made in the law for a Veterinary Reserve Corps or for an enlisted personnel. Provision is made for a Veterinary Officer's Reserve Corps with rank, pay and allowance of Second Lieutenant but no promotion.

There are fifty-eight men in the Veterinary Corps at present. None in the Veterinary Officer's Reserve Corps and only one hundred and sixty-two candidates for it.

The veterinary service is not organized and is practically without equipment.

The War Department now has approximately 115,000 horses and mules. Under present plans the number will probably be raised to 250,000.

The English army has an efficient veterinary service. Their present organization started at the time of the Boer War. It was carefully and thoroughly planned and has been in operation during the present conflict with most flattering and successful results. From a veterinarian's point of view the English service is ideal. Their old service was much like ours. Under it in the Boer War their losses were 60%. As a result of the present or-

*A report recently presented by the special committee of the A.V.M.A. on Army Veterinary Service to the Medical Section, Council of National Defense and to Surgeon General Gorgas and his staff.

ganization such losses have been reduced to less than 8%. They have found that the minimum number of equines needing veterinary treatment in the present war is 3% of the total number. Figured on this basis if we have 250,000 horses we should be prepared to handle at least 10,000 patients continuously. 625 veterinary officers and approximately 7,000 enlisted men should be provided to care for them. The total number of veterinary officers to be in the proportion of ¼ of 1% of the total number of animals; ¼ of 1% non-commissioned officers and 3% privates.

The English Veterinary Corps has a Director of Veterinary Service who has the rank of Major General. He has a complete organization which is thoroughly equipped with veterinary officers , non-commissioned officers, enlisted men, rations, clothing, shelter for men and animals, medical and surgical supplies with tools and implements for handling 15,000 to 17,000 patients. Animals that are sick, diseased, wounded, worn out or are incapacitated from any cause are turned over from the fighting forces and the remount stations to the veterinary corps which has full charge of them until they are cured, dead, destroyed or sold as unfit for army service. If cured they are returned to the remount service.

Calculating our requirements on the successful experience of the English army we should be equipped with the following:

1. One Veterinary Officer as Director of Veterinary Service located in Washington. One Veterinary Assistant and sufficient help.

2. One Veterinary Officer as Director of Veterinary Service in the field. Five Veterinary Assistants and sufficient help.

3. One Veterinary Officer, two non-commissioned officers and six privates, with each Remount Section of 1,000 horses or less.

4. Two Veterinary Officers for each regiment of Cavalry. Two Non-commissioned Officers as Assistants and two privates.

5. One Veterinary Officer with each Battalion of Artillery. One non-commissioned Officer as Assistant and one private.

6. One Veterinary Officer with each Brigade of Infantry. One non-commissioned Officer as Assistant and one private.

7. One Veterinary Officer with each Divisional Ammunition Train. One non-commissioned Officer as Assistant and one private.

8. One Veterinary Officer with each Divisional Train. One non-commissioned Officer as Assistant and one private.

9. One Veterinary Officer for each Horse Purchasing Board.

10. One Veterinary Officer for each Horse Transport.

MOBILE SECTIONS OR TEMPORARY HOSPITALS.

11. One Mobile Section for each Division of the Army.

12. One Mobile Section for each Cavalry Brigade.

13. Each Mobile Section to be equipped with one Veterinary Officer, three non-commissioned Officers and 17 privates.

BASE HOSPITALS.

14. One Base Hospital for each 25,000 horses and equipped to care for 1,250 patients.

15. Each Base Hospital equipped with five Veterinary Officers, 34 non-commissioned officers, 315 privates, as grooms and dressers, 12 horse shoers, for shoeing patients and training horse shoers, one saddler, two cooks, and 13 horses for the use of the officers in the hospital. This number of privates appears large. It would allow one for every four patients. This is the allowance made in the English army. The French army allows one to six and the Blue Cross one to eight. The English horses show much the best care, and are more fit for service when returned from the hospital.

16. One Veterinary Officer at each Medical Supply Depot in charge of collecting, packing and shipping supplies to the Army Veterinary Service. Sufficient help should be provided.

17. A Veterinary Officers' Reserve Corps should be provided, with the same rank, pay and allowances as now given the regular Veterinary Corps. Appointments and promotions to be made by the President upon the recommendation of the Surgeon-General through the Secretary of War.

18. A Commission of Veterinary Advisers for the Medical Board, Council of National Defense, is recommended.

19. Authority should be given and plans made for the Army Veterinary Service to co-operate with the Federal Bureau of Animal Industry, State Livestock Sanitary Officials and those interested in humane animal relief work.

---

—Dr. A. G. Fisk has resigned his position as Veterinarian for the Colorado Fuel and Iron Company at Trinidad, Colo. to accept a position as assistant manager of the Adams Cattle Co., a large cattle concern at Vermejo Park, New Mexico.

## EUROPEAN CHRONICLES

VIRULENCE OF APPARENTLY HEALTHY MUSCLES AND LYMPH GLANDS—What is the degree of virulence of these organs from cattle and swine affected with generalized tuberculosis, is the important question treated by Veterinarian Dr. P. Chausse in the *Annales de L'Institut Pasteur*. As an introduction the writer refers to the history of the question by saying: "It seems as if a number of works have been written and published on the virulence of muscles in generalized tuberculosis. Indeed no value can be attributed to the researches made by ingestion, as observed in experiments, in most part not published, that even Guinea-pigs resist the ingestion of several millions of very virulent and minutely divided bacilli and also a greater quantity of virus, if this consisted of bovine tuberculous material coarsely crushed."

As for the researches made by inoculation, it is not possible to accept those which refer to a very small number of muscular portions, sometimes only one, nor to those in which rabbits were used as subjects, knowing these animals resist inoculation of small doses.

Nor, says Chausse, shall we consider as insufficiently proved the experiments made by intraperitoneal inoculations with Guinea-pigs, because the peritoneum, better adapted to phagocytosis than connective tissue, may absorb some bacillar unities and then fail in revealing an extremely weak virulence.

In this method of research, the intranevous process is less desirable than the peritoneum as it is more favorable to phagocytosis.

Finally the causes of external soiling of the muscle have not always been guarded against with certainty.

The researches made in human species from subjects dead from tuberculosis, which seem to establish that the muscle is frequently virulent, do not permit the conclusion that it is the same with butchered animals. The latter, notwithstanding the disease, are most commonly in apparent good health, and again for human subjects, the blood and the muscles have been inoculated together and it is without doubt the blood which, in the positive cases, contained the pathogenic agents.

After this long history relating to what has been advanced by others, Chausse refers to the virulence of muscles, obtained

from swine and cattle butchered and seized for lesions of extensive tuberculosis with undoubted generalization. A description of the experiments is then given at length.

The virulence of lymph glands, macroscopically sound, forms the third part of Chausse's article. The minute precautions taken to know if these lymph glands, macroscopically sound, from advanced tuberculous animals, were virulent, are described and also the experiments and results obtained are considered.

The entire subject is then passed in review, the various results are discussed by the author and the conclusions arrived at, are here summarized:

1—"In *tuberculous animals, the examination of extra-visceral lymph glands must be made as long as generalization exists.* This examination will permit the recognition of the presence of existing tubercles when there and indicate the measures to be taken.

2—"*The use of the meat of subjects affected with generalized and massive lesions, does not present appreciable danger, even in a raw state.*

3—On the contrary, "*The consumption of lymph glands apparently healthy, is not free from danger, when these glands are not sufficiently cooked.*"

4—*The quite frequent establishment of the occult bacillosis of muscles and lymph glands imposes greater severity towards subjects, carriers of important visceral lesions.*

It must not be forgotten, however, that ingestion is a very difficult mode of infection and requires very large doses of virus and the danger is not to be exaggerated. ,

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Otacariasis—It is admitted in classics that the form of the affection known as *psoroptic* was recognized only as existing in the external auditory canal of rabbits and goats, although it has also been observed in the gazelle.

To Professor Henry of Alfort belongs the credit of having demonstrated that not only the above named animals were subject to *psoroptic otacariasis* but also, a very important fact, that it was not exceptional to find cases where the disease was observed in horses, donkeys, mules and sheep.

Although mobilized and engaged in the conflict, Henry has had many opportunities to investigate the subject and he has come to the conclusion that, while to this day, psoroptic mange of

horses has been considered as attacking first, the regions covered with hair, such as the top of the head, the poll, the mane, and the tail, and to spread to the trunk afterwards, the most frequent form was otacariasis, a condition which was demonstrated to him by the close examination and comparison between the number of cases of this variety of mange upon which the observations rested.

The macroscopic lesions are characteristic. Rarely are they unilateral, almost always both ears are affected. The disease is localized in the deepest part of the external auditory canal and to discover it, in the cadaver, the ear must be amputated at its base. Then the bottom of the canal is found packed with a mass of greyish yellow substance, made of wax and epidermic desquamation. More or less developed, it sometimes presents a central canal and when it is removed all in one piece it has the form of an irregular cone with its surface covered with more or less abundant colonies of psoroptes easily observed by the naked eye or as moving little whitish bodies. The skin of the auditory canal is red, moist and more or less desquamated. The psoroptes of the ear seem to have no characters different from those that are found in mangy animals.

The disease is never detected on the outside, yet some peculiar signs indicate its presence. An auricular pruritis is often present, though not always permanent. If animals are in warm stables or exposed to the sun, they may be restless, shaking the head and ears. If they have a chance, they rub themselves carefully at the base of the ear or the parotid region, either against the manger or with their feet, leaving marks over the parts which have been scratched. Gentle scratching with the hand may be supported well and again some animals resent it. The disease prevails in winter as well as in summer. Complications, such as suppurative or median otitis, meningitis, etc., as observed in otacariasis of carnivora or rabbits, were not noticed by Henry.

The diagnosis is difficult by the direct examination of the ear. The local itching or the marks left by the repeated scratching seems to be the only means of diagnosis.

The treatment recommended is simple and easy to apply. The animal is kept quiet with a twitch, an injection is made inside the ear, slowly to allow the liquid to go to the bottom of the auditory canal, with a strong, not irritating antipsoric solution, so as to dissolve the cerumen. Cresyl at 2% or 3% is excellent and

answers all purposes. The operation is to be renewed two or three times, eight days apart, before the ear can be expected to be free from the parasite.

---

CASTRATION OF COWS—Some time ago, before the war, at a meeting of the Societe Centrale, a discussion of the above named subject was held.

Castration of cows is an operation brought forward because of a communication made before the society. During the discussion, some peculiar remarks were made by one of the gentlemen present, who had had the opportunity of witnessing many wonderful performances relating to the operation. It was Mr. Even, who had lived in Buenos Aires for many years and who is known to a few of our friends at their visit in Europe for the lamentable breaking up of the International Veterinary Congress in London. The statements made by Mr. Even to the few who took part in the discussion, were principally on the modus operandi, the duration of the operation and the number of cows that one operator could castrate in one day.

In the Bulletin of the Society Centrale, of January and February, there is published a communication from two French veterinarians, now upon a military mission in Argentina, which brings the subject of the castration of female bovines in that country, as evidence of the correctness of the statements advanced in the discussion that I have mentioned above.

Without allusion to the generalities of the operation, the number of assistants required, the preparation and the instruments used by the operator in Argentina, I merely take notice here of the modus operandi and the duration of the operation, which no doubt are interesting.

For the former, say the authors of the communication: "With the right hand, the operator removes rapidly the vaginal mucus which is always abundant, he then seizes the ovariotomy knife, makes the puncture of the vagina, two fingers in width above the os uteri, then changes his hand, with the thumb and index he enlarges the incision so as to introduce two fingers (the index and the medius) takes hold of the right ovary first and pulls it into the vagina. With his right hand *without any assistance* he takes the ecraseur, passes it over the ovary, the chain, which he makes loose by pushing the handle against his own chest, and

amputates the ovary with all possible rapidity. He grasps the left ovary and removes it in the same manner."

The operation is over. From 4 to 6 seconds are sufficient to amputate both ovaries when once secured.

The duration of the operation is the most interesting part for those who are acquainted with the manipulation of the operation.

"Time between the moment the operator introduces his hand in the vagina and when he draws it out with both ovaries amputated: 1 min., 28 secs.; 3 mins., 10 secs.; 1 min.; 1 min., 40 secs.; 1 min., 30 secs.; 1 min. 27 secs.; 1 min., 34 secs.; 1 min., 32 secs.; 1 min., 28 secs.

"Time of the operation alone, from the perforation of the vagina to the ablation of the ovaries: 52 secs.; 55 secs.; 55 secs.; 58 secs.; 50 secs.; 57 secs.; 52 secs."

Generally speaking, and without hurrying, from 20 to 22 castrations were performed in an hour and as that is done for 8 or 10 hours a day, one is no longer surprised that the authors have witnessed 131 castrations in one day, 186 upon another, 126, 174 and so on.

No doubt the cow castrating trade must be very profitable in Argentina, if properly remunerated.

---

VENTRICLECTOMY AND VOCAL CORD RESECTION—I do not know if the first name is generally accepted, but if it is not it ought to be with the comparatively recent nomenclature admitted in medicine in general and in surgery in particular. At any rate, if it is better known to our readers than to myself, I think the writing of Professor Coquot, who occupies the chair of surgery in Alfort, is deserving of notice, for it calls attention to William's operation in the surgical treatment for roaring in horses "an operation simple, that every one can perform and ought to be tested, it is a fault not to perform it."

The article of Prof. Coquot in the *Recueil*, is not only to praise the operation of Williams, it has another object, viz: to complete it by the ablation of a more or less extensive portion of the vocal cords.

Reviewing concisely the history of the attempts made by Günther in 1845, who, says Coquot, tried successively the resection of the two cords, the ablation of the one on the paralyzed side,

the *ablation of the cord and of the corresponding ventricle* and then the partial or total excision of the arytenoid and finally of the arytenoid to the thyroid. Alluding to the experiments of Möller in Germany and of Fleming in England and quoting the last as having suggested the *excision of the vocal cord* at the same time as that of the arytenoid cartilage. After having given the anatomy of the larynx and its physiology, the professor remarks: "Following the ablation of the ventricular sac, the cicatricial change, by its retraction, draws gradually away the arytenoid from the median line to place it against the corresponding thyroid wing, the ventricle of the glottis disappears and the space of the glottis is enlarged." "But what becomes of the vocal cord during the repairing process?" "Paralyzed, inert and flabby, it has no tendency to follow actively the arytenoid in its outward retracting movement." It may then become a means of interference to the normal entrance of the air in the glottic portion of the laryngeal box.

It is while taking these possibilities into consideration that Coquot has, since 1913, performed the following complementary operation.

After ventriclectomy is performed, the vocal cord is taken hold of with a pair of forceps, in its middle, and with straight fine scissors above and below the forceps an incision is made, thus embracing the *middle portion of the cord* which is then incised below and permits the removal of a square piece of it.

After this excision the ventricle with its membrane removed is readily seen widely open and if it is necessary more or less mucous membrane which may have been left during the first operation, can be taken off.

The result of all this will be, says Coquot, as follows: "The cicatricial retraction will then be assisted, will be more rapid and any folding of the cord will be made impossible. The embryonic tissue, in which will be included the divided edges, will bring them closer together and the repaired vocal cord will be shorter than the original. Its thyroid insertion being fixed, its arytenoid, on the vocal apophysis will hold this in its new and favorable position; the arytenopexia will be more rapid, more complete and more certain, if not more solid."

Immediately after the operation the insertion of a temporary tracheotomy tube, especially made for the purpose, is recom-

mended as a sure means to prevent complications or accidents which may some times occur.

The roughening of the edges of the wounds of the vocal cord has never been essential in the subjects operated by Coquot.

In the presence of the immense number of successful results obtained by the simple process of William's operation, the question will no doubt be asked if the addition proposed here is advantageous, even with its simplicity.

---

Gastro and Enterotomy in the Dog—In the Veterinary Journal of February last, Canis Major has related a case where these operations were performed. One, the first, very successfully, the other from the condition of the lesions was not completed and the patient allowed to pass away quietly under an anesthetic. The record given by the Major is very interesting and very instructive. As to the etiology of the trouble, some of the symptoms showed peculiar characteristics and the conclusions that one may draw as indications to follow in similar cases are certainly very suggestive. I relate the article briefly.

A Scotch terrier, 3½ years old, had been previously treated for interdigital abscesses. Soon afterward he appeared poorly and emaciated and on that account medical advice was sought. As vomiting seemed to have been a frequent complaint, careful examination was made of the condition of the abdomen. This brought out the diagnosis of the presence of a foreign body. It was then stated by the owner that playing with an imitation rubber bone, the dog had torn it, swallowed several pieces and rejected some. Nevertheless, there was no doubt about the presence of a foreign body in the stomach and surgical interference was urgent.

Without going into the description of the operation, which, of course was performed with all care and precaution necessary, the foreign body, a piece of india rubber, was removed from the opened stomach, after which and after sterilization of the parts and sutures of the wound, the little dog was allowed to get over the period of anesthesia, which had been induced with one grain of morphia hydrochloride half an hour before the operation and followed with chloroform.

The recovery from this was simple and gave rise to no further events. The dog recovered, had a voracious appetite and no variation of temperature. It was a success.

A little over two weeks later, however, conditions changed. A new period of sickness prevailed. Another examination was made of the abdomen and palpation revealed again the presence of a foreign body posterior to the stomach.

A second operation was performed with the same attention and care as before. The foreign body was looked for, located with some difficulty and found in the bowel, which was incised and another piece of rubber bone about the size of a Brazil nut was extracted. The intestine was much thickened, edematous and as the cat gut sutures did not hold, after several attempts, the case was allowed to pass away quietly.

The symptoms presented by the dog were peculiar and worth recalling as Canis Major had the occasion to observe them some time afterwards in another dog, which had a foreign body in the intestines.

"The peculiarity of these symptoms were said to be rather amusing and were observed prior to and following upon the first operation. There was a sudden pulling up after a movement of the bowels, planting the fore feet straight out, extending the body and elevating the head. In this position the dog would remain for about thirty seconds, afterward resuming his walk and later going through the same process again. His appetite was abnormal, even devouring his own feces and while walking would rush at, seize and devour any small object resembling food.

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Post-Serial Tetanus—In the January number, 1917, of the *Annales de L'Institut Pasteur*, this question was the object of a long communication from Doctor August Lumiere. Although the fifty-four observations, which he related and summarized as the reasons for the article, are also referable to the disease in man, I have thought that without entering into the consideration of the early or latent tetanus or the symptomatology, prognosis and treatment of the post-serial disease, the general conclusions of Dr. Lumiere might prove of some interest and perhaps not without instruction.

1. Preventive injections of antitetanic serum do not possess an absolute and unlimited prophylactic action.

2. The duration of the absolute immunity conferred by the serum cannot be positively given; it depends upon the relative

proportion of toxin and preventive serum present in the organism.

3. Cases of post-serial tetanus appear to be due to the two following causes: (a) superabundance of secretion of toxins around the wound, proportionally below the dose of preventive serum injected, (early post-serial tetanus); (b) liberation of the tetanic spores, until then in a state of latent life, in the tissues, by a secondary surgical interference or a traumatism, when the activity of the antitoxin is exhausted, (late post-serial tetanus).

4. Early post-serial tetanus may in most cases be avoided by free incision of infected wounds, careful removal of all foreign bodies or substances they may contain, by free drainage and repeated injections of serum.

5. Late post-serial tetanus is also avoided in more than half of the cases, by injections of a new dose of serum, at the time of any secondary surgical action.

6. Preventive serum sometimes gives to post-serial tetanus peculiar characters, by altering more or less the symptomatology of the disease and its clinical evolution.

7—In a certain number of cases of post-serial tetanus injected antitoxin has prevented the fixation of the microbian poison upon the central nervous system, limiting its action to the motor nerves of the wounded limb. This localized tetanus without trismus is less severe than the others.

8. In a few other cases, the bulbo-medullary centers are only partially protected, then the appearance of a late or incomplete trismus, accompanying the local contracture, is observed.

9. When the antitoxin has not protected the central nervous centers, there is observed the post-serial form with trismus from the start. This is more frequent and requires a more severe prognosis.

10. The treatment of post-serial tetanus seems to demand the administration, as early as possible, of large doses of serum.

There is to this day no curative treatment, symptomatic manifestations are to be attended.

Against permanent contractions, one is disarmed, but paroxysmal spasms can be relieved by chloral, morphine, injections of sulfate of magnesia or of persulfate of soda. The latter seems to be the chosen drug on account of its efficacy and its weak toxicity.

## SUMMARY FROM RECENT PUBLICATIONS RECEIVED AND BIBLIOGRAPHIC ITEMS*

BUREAU OF ANIMAL INDUSTRY—*Bulletin 517*—(Professional.) An Intradermal Test for Bacterium Pullorum Infection in Fowls. *Bulletin 781* (Farmer). Tuberculosis of Hogs. *Bulletin 777*. Feeding and Management of Dairy Calves and Young Stock. *Bulletin 790*—Contagious Abortion of Cattle. *Bulletin 784*—Anthrax or Charbon. *Bulletin 779*—How to Select a Sound Horse.

IL NUOVO ERCOLANI.—March. Report of the First Year of Military Laboratory of the Polyvalent Antipyogenic Serum of Lanfranchi. Some Special Indications of Surgical Interference. March. (O) Some Peculiar Surgical Interferences.

BULLETIN DE LA SOCIETE CENTRALE.—Jan. and Feb. (X) Otacariasis and Prophylaxis of Psoroptic Mange. (X) Castration of Cows in Argentina. Treatment of Mange. (O) Sudden Death by Thrombus of Left Ventricle. (O) Intra-tracheal Injections.

REVUE GENERALE DE MEDECINE VETERINAIRE.—(X) Polyvalent Serum in Veterinary Practice Therapeutic. (X) Treatment of Wounds.

VETERINARY JOURNAL.—March—(X) Tips on the Camel. Impetigo. Fluke in Sheep. Tetanus Bacilli and Microbian Associates. (O) Uterine Septicemia. (O) Eversion of the Uterus with Milk Fever. (O) Schrapnel Injury. (O) Eversion of the Uterus in a Mare.

VETERINARY NEWS.—(O) Clinical Notes. Gastric and Intestinal Tympany and Esophageal Trouble. (O) Anthrax in a Cow. (O) Rupture of the Perforans Tendon. March 17th.—Mammitis in Cows. (O) An Interesting Case. (O) An interesting Case of Fibromata. Remarks on Feline Practice.

VETERINARY RECORD.—March.—Purpura. (O) Unusual Cases. Black Quarter? in Pigs. (O) Induction of Premature Labor in Mares and Cows. Vesicular Stomatitis Contagiosa. March 24.—Interesting Case of Fibromata. March 31.—Suppurate Infection of the Coronet and Pastern. (X) History of Mallein in England.

A. LIAUTARD.

*Titles marked "X" will be summarized. Those marked "O" will appear as abstracts.

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—Dr. W. H. Ridge of Pennsylvania spoke on Dr. Williams' method of treating sterility in cattle at a meeting of the Portland Farmers' Club at Portland, Maine, April 11. An invitation was extended to the Maine Veterinary Medical Association, in its annual session, to attend the evening meeting.

—Dr. John T. Dallas of the Bureau of Animal Industry has been transferred from Provo, Utah to New Albany, Miss.

# THE VIRULENCE OF HOG-CHOLERA BLOOD AT DIFFERENT PERIODS DURING THE DISEASE

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The object of this study was to ascertain if possible the virulence of hog-cholera blood at different periods during the course of the acute type of the disease. Also to ascertain the average time in which hog-cholera blood reaches its maximum virulence following inoculation. In the production of hog-cholera blood for serum purposes any method by which the opportune time for killing virus hogs could be shortened would mean great economy in time, cost and probably an increase in the potency of the final anti-serum.

During 1914, 1915 and 1916, eleven groups of from four to fourteen susceptible hogs of about a hundred pounds in weight were inoculated with 2 or 2.5 cubic centimeters of hog-cholera blood, known as stock virus of eight day strain.

It has been our practice at this station for the past three years to maintain the virulence of our virus blood by frequent passage through the bodies of suckling pigs, from three to five weeks of age, from susceptible dams. Some of the blood obtained from these pigs is used for the inoculation of another series of pigs while the balance of this blood is used for the production of virus. When the suckling pigs are killed seven, eight or nine days after inoculation, the blood is known as seven, eight or nine day stock blood. Phenol is added to this blood (½%) two days previous to the inoculation of susceptible hogs which are intended for virus production.

The body temperatures of the virus hogs were taken daily with a few omissions until the last bleeding, after which admittance into the virus house was avoided for fear of carrying the infection to the experimental pens. All virus hogs which failed to react to the inoculations were discarded from the experiments. Four, five, six, seven and eight days after inoculation, as hereinafter described, these virus hogs were bled aseptically from the tails into sterilized test tubes. An equal amount of blood from each hog of the same bleeding was mixed together. This mixed blood was then used to inoculate susceptible pigs from non-vaccinated dams.

These pigs varied in weight from forty to fifty pounds. The blood was administered intramuscularly in one-half and one cubic centimeter doses. One or more pigs of a litter were used for each of the inoculations, and as controls against hog-cholera by pen exposure. All of the pigs except a few were allowed to die. They were placed in thoroughly disinfected pens having concrete floors. Feed was kept free from any probable hog cholera contamination. The body temperatures were taken nearly every day except Sunday. Owing to their extensiveness the body temperatures are omitted from the tables. The usual precautions were observed in protecting the pigs against exposure to hog-cholera from outside sources such as feed, clothing and implements. We were quite successful in this respect, as will be noted only one lot of pigs was involved with probable outside infection. On the other hand quite a few pigs having partial immunity were encountered. In neither case are the involved pigs included in the final summary.

EXPERIMENT I. Ten virus hogs were bled from the tail five days following inoculation. Five were killed seven days following inoculation, when samples of blood were collected in sterile test tubes. Only the blood of these five was used in the experiment. The five and seven day samples were mixed separately, that is the five-day bleeds were kept separate from the seven-day bleeds, and each mixture injected into six pigs. Four pigs of the same litters were used as controls against pen exposure. It is quite probable that hog 779 was infected previous to inoculation, although no symptoms were exhibited before the third day following inoculation.

The results of the experiment show that the seven-day final blood is slightly more virulent than the five-day tail blood, and that more variation occurred in the duration of the disease following the injection of one-half cubic centimeter than with the one cubic centimeter of blood. Table I shows the kind of virus injected and the duration of the disease.

EXPERIMENT II. Eight virus hogs were bled from the tails five days after inoculation. Four were again bled from the tails seven days after inoculation. Only the blood of these four was used in the experiment. The five and seven-day bleedings were mixed separately and injected into pigs as in Experiment I. Of these pigs Nos. 248 and 262 were evidently partially immune and are not included in the final summary, neither is pig 249 included

TABLE NO. I.

| Pig No. | Weight lbs. | Date | Dose c.c. | Virulent Blood | Duration and Lesions of Hog-Cholera |
|---|---|---|---|---|---|
| 779 | 100 | 10–28–14 | 2 | 8-day stock virus | Killed in 7 days, well marked |
| 781 | 100 | 10–28–14 | 2 | 8-day stock virus | Killed in 7 days, well marked |
| 782 | 100 | 10–28–14 | 2 | 8-day stock virus | Killed in 7 days, well marked |
| 785 | 100 | 10–28–14 | 2 | 8-day stock virus | Killed in 7 days, well marked |
| 786 | 100 | 10–28–14 | 2 | 8-day stock virus | Killed in 7 days, well marked |
| 348 | 40 | 11– 3–14 | ½ | 5th day tail-bled from above hogs | Killed in 11 days, well marked |
| 349 | 45 | 11– 3–14 | ½ | 5th day tail-bled from above hogs | Killed in 10 days, well marked |
| 350 | 40 | 11– 3–14 | ½ | 5th day tail-bled from above hogs | Killed in 16 days, fairly well marked |
| 345 | 40 | 11– 3–14 | 1 | 5th day tail-bled from above hogs | Killed in 12 days, well marked |
| 346 | 40 | 11– 3–14 | 1 | 5th day tail-bled from above hogs | Killed in 13 days, well marked |
| 347 | 40 | 11– 3–14 | 1 | 5th day tail-bled from above hogs | Killed in 13 days, well marked |
| 992 | 45 | 11– 4–14 | — | Control—pen exposed | Killed in 22 days, well marked |
| 993 | 40 | 11– 4–14 | — | Control—pen exposed | Killed in 29 days, fair to poor |
| 112 | 40 | 11– 4–14 | ½ | 7th day final bled from above hogs | Killed in 13 days, well marked |
| 114 | 40 | 11– 4–14 | ½ | 7th day final bled from above hogs | Killed in 14 days, well marked |
| 104 | 40 | 11– 4–14 | ½ | 7th day final bled from above hogs | Killed in 10 days, well marked |
| 103 | 40 | 11– 4–14 | 1 | 7th day final bled from above hogs | Killed in 14 days, well marked |
| 109 | 40 | 11– 4–14 | 1 | 7th day final bled from above hogs | Killed in 13 days, well marked |
| 106 | 40 | 11– 4–14 | 1 | 7th day final bled from above hogs | Killed in 12 days, well marked |
| 111 | 40 | 11– 4–14 | — | Control—pen exposed | Killed in 19 days, fair to poor |
| 107 | 40 | 11– 4–14 | — | Control—pen exposed | Killed in 19 days, fair to good |

TABLE NO. II.

| Pig No. | Weight lbs. | Date | Dose c.c. | Virulent Blood | Duration and Lesions of Hog-Cholera |
|---|---|---|---|---|---|
| 151 | 100 | 1-12-15 | 2 | 8-day stock virus | Killed in 8 days, well marked |
| 152 | 100 | 1-12-15 | 2 | 8-day stock virus | Killed in 8 days, well marked |
| 155 | 100 | 1-12-15 | 2 | 8-day stock virus | Killed in 8 days, well marked |
| 159 | 100 | 1-12-15 | 2 | 8-day stock virus | Killed in 8 days, well marked |
| 263 | 40 | 1-19-15 | ½ | 5th day tail bled from above hogs | Killed in 31 days, fair to poor |
| 265 | 40 | 1-19-15 | ½ | 5th day tail bled from above hogs | Killed in 20 days, well marked |
| 264 | 40 | 1-19-15 | 1 | 5th day tail bled from above hogs | Killed in 20 days, well marked |
| 266 | 40 | 1-19-15 | 1 | 5th day tail bled from above hogs | Killed in 15 days, well marked |
| 261 | 40 | 1-19-15 | — | Control—pen exposed | Killed in 17 days, well marked |
| *262 | 40 | 1-19-15 | — | Control—pen exposed | Killed in 42 days, well marked |
| 251 | 40 | 1-19-15 | ½ | 7th day tail bled from above hogs | Killed in 13 days, poor to fair |
| 252 | 40 | 1-19-15 | ½ | 7th day tail bled from above hogs | Killed in 13 days, fair to good |
| *249 | 40 | 1-19-15 | 1 | 7th day tail bled from above hogs | Killed in 9 days, slight enteritis |
| 253 | 40 | 1-19-15 | 1 | 7th day tail bled from above hogs | Killed in 13 days, well marked |
| 250 | 40 | 1-19-15 | — | Control—pen exposed | Killed in 20 days, well marked |
| *248 | 40 | 1-19-15 | — | Control—pen exposed | Killed in 49 days, poor |

*Excluded from summary.

TABLE NO. III.

| Pig No. | Weight lbs. | Date | Dose c.c. | Virulent Blood | Duration and Lesions of Hog-Cholera |
|---|---|---|---|---|---|
| 1 | 100 | 1–12–15 | 2 | 8-day stock virus | Killed in 10 days, well marked |
| 2 | 100 | 1–12–15 | 2 | 8-day stock virus | Killed in 9 days, well marked |
| 4 | 100 | 1–12–15 | 2 | 8-day stock virus | Killed in 10 days, well marked |
| 6 | 100 | 1–12–15 | 2 | 8-day stock virus | Killed in 10 days, well marked |
| 7 | 100 | 1–12–15 | 2 | 8-day stock virus | Killed in 10 days, well marked |
| 8 | 100 | 1–12–15 | 2 | 8-day stock virus | Killed in 9 days, well marked |
| 160 | 100 | 1–12–15 | 2 | 8-day stock virus | Killed in 9 days, well marked |
| 258 | 40 | 1–19–15 | ½ | 6th day tail bled from above hogs | Killed in 15 days, well marked |
| 259 | 40 | 1–19–15 | ½ | 6th day tail bled from above hogs | Killed in 17 days, well marked |
| 254 | 40 | 1–19–15 | 1 | 6th day tail bled from above hogs | Killed in 11 days, fair to good |
| 260 | 40 | 1–19–15 | 1 | 6th day tail bled from above hogs | Killed in 16 days, fairly well marked |
| 255 | 40 | 1–19–15 | — | Control—pen exposed | Killed in 17 days, well marked |
| 257 | 40 | 1–19–15 | — | Control—pen exposed | Killed in 20 days, well marked |
| 281 | 40 | 1–20–15 | ½ | 8th day tail bled from above hogs | Killed in 12 days, well marked |
| 284 | 40 | 1–20–15 | ½ | 8th day tail bled from above hogs | Killed in 12 days, well marked |
| 280 | 40 | 1–20–15 | 1 | 8th day tail bled from above hogs | Killed in 10 days, well marked |
| 283 | 40 | 1–20–15 | 1 | 8th day tail bled from above hogs | Killed in 13 days, fairly well marked |
| 286 | 40 | 1–20–15 | — | Control—pen exposed | Killed in 23 days, well marked |
| 282 | 40 | 1–20–15 | — | Control—pen exposed | Killed in 16 days, well marked |

TABLE NO. IV.

| Pig No. | Weight lbs. | Date | Dose c.c. | Virulent Blood | Duration and Lesions of Hog-Cholera |
|---|---|---|---|---|---|
| 86 | 100 | 2-24-15 | 2 | 8-day stock virus | Killed in 8 days, well marked |
| 87 | 100 | 2-24-15 | 2 | 8-day stock virus | Killed in 8 days, well marked |
| 88 | 100 | 2-24-15 | 2 | 8-day stock virus | Killed in 9 days, well marked |
| 91 | 100 | 2-24-15 | 2 | 8-day stock virus | Killed in 11 days, well marked |
| 92 | 100 | 2-24-15 | 2 | 8-day stock virus | Killed in 9 days, well marked |
| 98 | 100 | 2-24-15 | 2 | 8-day stock virus | Killed in 8 days, well marked |
| 99 | 100 | 2-24-15 | 2 | 8-day stock virus | Killed in 8 days, well marked |
| 100 | 100 | 2-24-15 | 2 | 8-day stock virus | Killed in 8 days, well marked |
| 355 | 100 | 2-24-15 | 2 | 8-day stock virus | Killed in 8 days, well marked |
| *381 | 40 | 3- 4-15 | ½ | 5th day tail bled from above hogs | Lived, vaccinated 40th day |
| 383 | 40 | 3- 4-15 | 2 | 5th day tail bled from above hogs | Killed in 27 days, fair to good |
| 380 | 40 | 3- 4-15 | 1 | 5th day tail bled from above hogs | Killed in 25 days, fair to good |
| *379 | 40 | 3- 4-15 | 1 | 5th day tail bled from above hogs | Lived vaccinated 40th day |
| *382 | 40 | 3- 4-15 | — | Control—pen exposed | Killed in 41 days, poor |
| 384 | 40 | 3- 4-15 | — | Control—pen exposed | Killed in 23 days, fair to poor |
| 386 | 40 | 3- 4-15 | ½ | 7th day tail bled from above hogs | Killed in 15 days, well marked |
| 390 | 40 | 3- 4-15 | ½ | 7th day tail bled from above hogs | Killed in 16 days, well marked |
| 388 | 40 | 3- 4-15 | 1 | 7th day tail bled from above hogs | Killed in 42 days, well marked |
| 391 | 40 | 3- 4-15 | 1 | 7th day tail bled from above hogs | Killed in 15 days, well marked |
| 385 | 40 | 3- 4-15 | — | Control—pen exposed | Killed in 27 days, well marked |
| 392 | 40 | 3- 4-15 | — | Control—pen exposed | Killed in 26 days, well marked |

*Excluded from summary.

in the final summary as death was hastened by indigestion. Autopsy revealed extreme enteritis.

The results of this experiment show a stronger reaction with one cubic centimeter than with one-half cubic centimeter of blood, and that the seven-day blood was more virulent than the five-day blood. Table II shows the kind of virus injected and the duration of the disease.

EXPERIMENT III. Eight hogs were inoculated with virus. Seven were bled from the tails six and eight days following inoculation. The six and eight-day bleedings were mixed separately and injected into susceptible pigs as in the preceding experiments.

The results of this experiment show a slightly stronger reaction with one cubic centimeter than with one-half cubic centimeter of blood, and that the eight-day blood is more virulent that the six-day tail blood. Table III shows the kind of virus injected and the duration of the disease.

EXPERIMENT IV. Nine virus hogs were bled from the tails five and seven days following inoculation. These bleedings were mixed separately and injected into susceptible pigs as in the preceding experiments. Two of these pigs 379 and 381 recovered from the injections, while pig 382 died forty-one days after injection. These three pigs are not included in the final summary. Litter mates of these pigs received the seven-day blood and died in from twelve to sixteen days following injection.

The results of this experiment show a marked difference in virulence between the five and seven-day tail bleedings, and a slightly greater degree of virulence with one cubic centimeter than with one-half cubic centimeter of blood. Table IV shows the kind of virus injected and the duration of the disease.

EXPERIMENT V. Five virus hogs were tail bled five and seven days following inoculation. These bleedings were mixed and injected into susceptible pigs as in the preceding experiments.

The results of this experiment show that the seven-day bleedings were more virulent than the five-day bleedings, and that one-half cubic centimeter of blood was more virulent in both the five and seven-day bleedings than one cubic centimeter. Table V shows the kind of virus injected and the duration of the disease.

EXPERIMENT VI. Nine out of fourteen virus hogs were bled from the tails four and eight days following inoculation. The bleedings were mixed separately and injected into susceptible pigs

TABLE NO. V.

| Pig No. | Weight lbs. | Date | Dose c.c. | Virulent Blood | Duration and Lesions of Hog-Cholera |
|---|---|---|---|---|---|
| 564 | 100 | 4–17–15 | 2 | 8-day stock virus | Killed in 8 days, well marked |
| 566 | 100 | 4–17–15 | 2 | 8-day stock virus | Killed in 9 days, well marked |
| 570 | 100 | 4–17–15 | 2 | 8-day stock virus | Killed in 8 days, well marked |
| 572 | 100 | 4–17–15 | 2 | 8-day stock virus | Killed in 8 days, well marked |
| 574 | 100 | 4–17–15 | 2 | 8-day stock virus | Killed in 8 days, well marked |
| 528 | 40 | 4–24–15 | ½ | 5th day tail bled from above hogs | Killed in 20 days, well marked |
| 532 | 40 | 4–24–15 | ½ | 5th day tail bled from above hogs | Killed in 10 days, well marked |
| 531 | 40 | 4–24–15 | ½ | 5th day tail bled from above hogs | Killed in 17 days, well marked |
| 533 | 40 | 4–24–15 | ½ | 5th day tail bled from above hogs | Killed in 18 days, well marked |
| 529 | 40 | 4–24–15 | — | Control—pen exposed | Killed in 20 days, well marked |
| 530 | 40 | 4–24–15 | ½ | Control—pen exposed | Killed in 18 days, well marked |
| 521 | 40 | 4–24–15 | ½ | 7th day tail bled from above hogs | Killed in 11 days, well marked |
| 523 | 40 | 4–24–15 | ½ | 7th day tail bled from above hogs | Killed in 13 days, well marked |
| 525 | 40 | 4–24–15 | ½ | 7th day tail bled from above hogs | Killed in 13 days, well marked |
| 526 | 40 | 4–24–15 | ½ | 7th day tail bled from above hogs | Killed in 16 days, well marked |
| 524 | 40 | 4–24–15 | — | Control—pen exposed | Killed in 17 days, well marked |
| 527 | 40 | 4–24–15 | — | Control—pen exposed | Killed in 17 days, well marked |

TABLE NO. VI.

| Pig No. | Weight lbs. | Date | Dose c.c. | Virulent Blood | Duration and Lesions of Hog-Cholera |
|---|---|---|---|---|---|
| 298 | 100 | 10–13–15 | 2 | 8-day stock virus | Killed in 9 days, extreme |
| 300 | 100 | 10–13–15 | 2 | 8-day stock virus | Killed in 9 days, extreme |
| 301 | 100 | 10–13–15 | 2 | 8-day stock virus | Killed in 10 days, extreme |
| 302 | 100 | 10–13–15 | 2 | 8-day stock virus | Killed in 11 days, extreme |
| 304 | 100 | 10–13–15 | 2 | 8-day stock virus | Killed in 9 days, well marked |
| 305 | 100 | 10–13–15 | 2 | 8-day stock virus | Killed in 9 days, well marked |
| 307 | 100 | 10–13–15 | 2 | 8-day stock virus | Killed in 19 days, extreme |
| 309 | 100 | 10–13–15 | 2 | 8-day stock virus | Killed in 9 days, extreme |
| 310 | 100 | 10–13–15 | 2 | 8-day stock virus | Killed in 9 days, extreme |
| 178 | 40–50 | 10–21–15 | ½ | 4th day tail bled from above hogs | Killed in 11 days well marked |
| 181 | 40–50 | 10–21–15 | ½ | 4th day tail bled from above hogs | Killed in 14 days, well marked |
| 184 | 40–50 | 10–21–15 | ½ | 4th day tail bled from above hogs | Killed in 20 days, well marked |
| 182 | 40–40 | 10–21–15 | — | Control—pen exposed | Killed in 23 days, well marked |
| *179 | 40–50 | 10–21–15 | ½ | 8th day tail bled from above hogs | Killed in 11 days well marked |
| *185 | 40–50 | 10–21–15 | ½ | 8th day tail bled from above hogs | Killed in 15 days, well marked |
| *301 | 40–50 | 10–21–15 | ½ | 8th day tail bled from above hogs | Killed in 11 days well marked |
| *180 | 40–50 | 10–21–15 | — | Control—pen exposed | Killed in 14 days, well marked |

*Excluded from summary.

TABLE NO. VII.

| Pig No. | Weight lbs. | Date | Dose c.c. | Virulent Blood | Duration and Lesions of Hog-Cholera |
|---|---|---|---|---|---|
| 391 | 100 | 11-15-15 | 3 | 8-day stock virus | Killed in 7 days, well marked |
| 394 | 100 | 11-15-15 | 3 | 8-day stock virus | Killed in 7 days, well marked |
| 395 | 100 | 11-15-15 | 3 | 8-day stock virus | Killed in 7 days, well marked |
| 397 | 100 | 11-15-15 | 3 | 8-day stock virus | Killed in 7 days, well marked |
| 399 | 100 | 11-15-15 | 3 | 8-day stock virus | Killed in 7 days, well marked |
| 400 | 100 | 11-15-15 | 3 | 8-day stock virus | Killed in 7 days, well marked |
| 279 | 40-50 | 11-24-15 | ½ | 4th day tail bled from above hogs | Killed in 17 days, well marked |
| 280 | 40-50 | 11-24-15 | ½ | 4th day tail bled from above hogs | Killed in 17 days, well marked |
| 281 | 40-50 | 11-24-15 | ½ | 4th day tail bled from above hogs | Killed in 16 days, well marked |
| 278 | 40-50 | 11-24-15 | — | Control—pen exposed | Killed in 23 days, well marked |
| 275 | 40-50 | 11-24-15 | ½ | 7th day final bled from above hogs | Killed in 9 days, well marked |
| 276 | 40-50 | 11-24-15 | ½ | 7th day final bled from above hogs | Killed in 10 days, well marked |
| 277 | 40-50 | 11-24-15 | ½ | 7th day final bled from above hogs | Killed in 9 days, well marked |
| 274 | 40-50 | 11-24-16 | — | Control—pen exposed | Killed in 15 days, well marked |

as in the preceding experiments. In this and all succeeding experiments only one-half cubic centimeter of blood was used for inoculating the experimental pigs. As the control with the pigs, which received the eight-day virus, became infected apparently from an outside source, these four pigs are not included in the final summary.

The results of this experiment show that the four-day blood produced death on an average of fifteen days. If one could accept the temperatures of the pigs inoculated with the eight-day blood as due to the inoculation and not due to pen exposure, this blood might be considered more virulent than the four-day blood as it produced death on an average of less than thirteen days. Table VI shows the kind of virus injected and the duration of the disease.

EXPERIMENT VII. Ten hogs were inoculated with virus. Of these six were bled from the tails and killed in seven days following inoculation. Equal amounts of the tail bleedings and the final bleedings were mixed separately and injected into susceptible pigs as in the previous experiment.

The result of this experiment shows that the seven-day final blood was considerably more virulent than the four-day tail blood. Table VII shows the kind of virus injected and the duration of the disease.

EXPERIMENT VIII. Ten virus hogs were bled from the tails four days after inoculation. Eight days after inoculation four were killed and six were tail bled. The blood of the four was mixed with the six eight-day tail bleedings. Both the four and eight-day bleedings were then injected separately into susceptible pigs as in the preceding experiments. Of these pigs 470 and 477 were immune and are not included in the final summary.

The result of this experiment shows that the eight-day mixed tail and final blood was more virulent than the four-day tail blood. Table VIII shows the kind of virus injected and the duration of the disease.

EXPERIMENT IX. Seven out of ten virus hogs were bled from the tails four days and killed eight days following inoculation. The bleedings were mixed separately and injected into susceptible pigs as in the preceding experiments.

The result of this experiment shows that the eight-day final blood was more virulent than the four-day tail blood. But not any more so than in the preceding experiment where the eight-day

TABLE NO. VIII.

| Pig No. | Weight lbs. | Date | Dose c.c. | Virulent Blood | Duration and Lesions of Hog-Cholera |
|---|---|---|---|---|---|
| 209 | 100 | 2-14-16 | 2½ | 8-day stock virus | Lived, vaccinated |
| 211 | 100 | 2-14-16 | 2½ | 8-day stock virus | Killed in 8 days, well marked |
| 213 | 100 | 2-14-16 | 2½ | 8-day stock virus | Killed in 8 days, well marked |
| 215 | 100 | 2-14-16 | 2½ | 8-day stock virus | Killed in 8 days, well marked |
| 216 | 100 | 2-14-16 | 2½ | 8-day stock virus | Killed in 11 days, well marked |
| 217 | 100 | 2-14-16 | 2½ | 8-day stock virus | Killed in 9 days, well marked |
| 219 | 100 | 2-14-16 | 2½ | 8-day stock virus | Killed in 8 days, well marked |
| 221 | 100 | 2-14-16 | 2½ | 8-day stock virus | Killed in 11 days, slight |
| 222 | 100 | 2-14-16 | 2½ | 8-day stock virus | Killed in 9 days, well marked |
| 223 | 100 | 2-14-16 | 2½ | 8-day stock virus | Killed in 16 days, well marked |
| 474 | 40-50 | 2-23-15 | ½ | 4th day tail bled from above hogs | Killed in 15 days, well marked |
| 476 | 40-50 | 2-23-15 | ½ | 4th day tail bled from above hogs | Killed in 15 days, well marked |
| *477 | 40-50 | 2-23-15 | ½ | 4th day tail bled from above hogs | Lived, vaccinated |
| 475 | 40-50 | 2-23-15 | — | Control—pen exposed | Killed in 26 days, well marked |
| *470 | 40-50 | 2-23-15 | ½ | 8th day tail and final bled from above hogs | Lived, vaccinated |
| 471 | 40-50 | 2-23-15 | ½ | 8th day tail and final bled from above hogs | Killed in 12 days, well marked |
| 472 | 40-50 | 2-23-15 | ½ | 8th day tail and final bled from above hogs | Killed in 12 days, well marked |
| 473 | 40-50 | 2-23-15 | — | Control—pen exposed | Killed in 22 days, well marked |

*Excluded from summary.

TABLE No. IX.

| Pig No. | Weight lbs. | Date | Dose c.c. | Virulent Blood | Duration and Lesions of Hog-Cholera |
|---|---|---|---|---|---|
| 374 | 100 | 3- 6-16 | 2½ | 8-day stock virus | Killed in 8 days, well marked |
| 375 | 100 | 3- 6-16 | 2½ | 8-day stock virus | Killed in 8 days, well marked |
| 376 | 100 | 3- 6-16 | 2½ | 8-day stock virus | Killed in 8 days, well marked |
| 378 | 100 | 3- 6-16 | 2½ | 8-day stock virus | Killed in 8 days, well marked |
| 379 | 100 | 3- 6-16 | 2½ | 8-day stock virus | Killed in 8 days, well marked |
| 382 | 100 | 3- 6-16 | 2½ | 8-day stock virus | Killed in 8 days, well marked |
| 383 | 100 | 3- 6-16 | 2½ | 8-day stock virus | Killed in 8 days, well marked |
| 515 | 40-50 | 3-16-16 | ½ | 4th day tail bled from above hogs | Killed in 16 days, well marked |
| 516 | 40-50 | 3-16-16 | ½ | 4th day tail bled from above hogs | Killed in 13 days, well marked |
| 517 | 40-50 | 3-16-16 | ½ | 4th day tail bled from above hogs | Killed in 19 days, well marked |
| 518 | 40-50 | 3-16-16 | — | Control—pen exposed | Killed in 18 days, well marked |
| 512 | 40-50 | 3-16-16 | ½ | 8th day final bled from above hogs | Killed in 14 days, well marked |
| 513 | 40-50 | 3-16-16 | ½ | 8th day final bled from above hogs | Killed in 13 days, well marked |
| 514 | 40-50 | 3-16-16 | ½ | 8th day final bled from above hogs | Killed in 14 days, well marked |
| 511 | 40-50 | 3-16-16 | — | Control—pen exposed | Killed in 18 days, well marked |

TABLE No. X.

| Pig No. | Weight lbs. | Date | Dose c.c. | Virulent Blood | Duration and Lesions of Hog-Cholera |
|---|---|---|---|---|---|
| 558 | 100 | 3-31-16 | 2½ | 8-day stock virus | Lived, vaccinated |
| 559 | 100 | 3-31-16 | 2½ | 8-day stock virus | Killed in 10 days, well marked |
| 560 | 100 | 3-31-16 | 2½ | 8-day stock virus | Killed in 12 days, well marked |
| 561 | 100 | 3-31-16 | 2½ | 8-day stock virus | Lived, vaccinated |
| 563 | 100 | 3-31-16 | 2½ | 8-day stock virus | Lived, vaccinated |
| 564 | 100 | 3-31-16 | 2½ | 8-day stock virus | Killed in 13 days, slight |
| 565 | 100 | 3-31-16 | 2½ | 8-day stock virus | Killed in 10 days, slight |
| 566 | 100 | 3-31-16 | 2½ | 8-day stock virus | Killed in 10 days, well marked |
| 567 | 100 | 3-31-16 | 2½ | 8-day stock virus | Lived, vaccinated |
| 568 | 100 | 3-31-16 | 2½ | 8-day stock virus | Killed in 10 days, well marked |
| 615 | 40-50 | 4-11-16 | ½ | 5th day tail bled from above hogs | Killed in 25 days, well marked |
| 616 | 40-50 | 4-11-16 | ½ | 5th day tail bled from above hogs | Killed in 17 days, well marked |
| 617 | 40-50 | 4-11-16 | ½ | 5th day tail bled from above hogs | Killed in 18 days, well marked |
| 618 | 40-50 | 4-11-16 | — | Control—pen exposed | Killed in 22 days, well marked |
| 619 | 40-50 | 4-11-16 | ½ | 7th day tail bled from above hogs | Killed in 17 days, well marked |
| *620 | 40-50 | 4-11-16 | ½ | 7th day tail bled from above hogs | Killed in 30 days, slight—chronic |
| 621 | 40-50 | 4-11-16 | ½ | 7th day tail bled from above hogs | Killed in 17 days, slight—acute |
| 622 | 40-50 | 4-11-16 | — | Control—pen exposed | Killed in 16 days, well marked |

*Excluded from summary.

blood was made up of mixed final and tail bleedings. Table IX shows the kind of virus injected and the duration of the disease.

EXPERIMENT X. Ten virus hogs were bled from the tails five and seven days following inoculation. The bleedings were mixed separately and injected into susceptible pigs as in the preceding experiments. Pig 620 was apparently partially immune and is not included in the final summary.

The result of this experiment shows a greater degree of virulence in the seven-day than in the five-day tail blood. Table X shows the kind of virus injected and the duration of the disease.

EXPERIMENT XI. Ten virus hogs were bled from the tails five and seven days following inoculation. The bleedings were mixed separately and injected into susceptible pigs as in the preceding experiments. Pig 664 was apparently partially immune and is not included in the final summary.

The result of this experiment shows a slightly greater degree of virulence with the seven-day than with the five-day tail blood. Table XI shows the kind of virus injected and the duration of the disease.

SUMMARY. In the preceding experiments over one hundred pigs were used. The results of these experiments show a gradual increase in virulence of tail-bled blood from four to eight days following inoculation. This increase in virulence is also shown in the averages of the control pigs, except those exposed to the eight-day blood pigs. In these there is an apparent slight increase in the average number of days lived.

A peculiarity noted in several of the experiments was the fact that the disease when definitely established was of shorter duration in the control pigs than in the inoculated pigs. That is a control pig would contract cholera from an inoculated pig and die before the inoculated pig.

In regard to the amount of blood inoculated, one cubic centimeter was more virulent than one-half cubic centimeter. The average number of days lived was one day less with one cubic centimeter than with one-half cubic centimeter of blood.

Blood obtained on slaughter seven and eight days following inoculation proved to be more virulent than any of the tail bleedings. The average number of days lived being one day less than that shown by the seven and eight-day tail bleedings. Thus indicating that final (stuck) is slightly more virulent than tail blood.

TABLE No. XI.

| Pig No. | Weight lbs. | Date | Dose c.c. | Virulent Blood | Duration and Lesions of Hog-Cholera |
|---|---|---|---|---|---|
| 650 | 100 | 4- 6-16 | 2½ | 8-day stock virus | Lived, vaccinated |
| 652 | 100 | 4- 6-16 | 2½ | 8-day stock virus | Lived, vaccinated |
| 653 | 100 | 4- 6-16 | 2½ | 8-day stock virus | Killed in 11 days, well marked |
| 654 | 100 | 4- 6-16 | 2½ | 8-day stock virus | Killed in 8 days, slight |
| 655 | 100 | 4- 6-16 | 2½ | 8-day stock virus | Killed in 9 days, well marked |
| 656 | 100 | 4- 6-16 | 2½ | 8-day stock virus | Killed in 8 days, slight |
| 657 | 100 | 4- 6-16 | 2½ | 8-day stock virus | Killed in 8 days, slight |
| 658 | 100 | 4- 6-16 | 2½ | 8-day stock virus | Killed in 8 days, well marked |
| 659 | 100 | 4- 6-16 | 2½ | 8-day stock virus | Lived, vaccinated |
| 658-a | 40-50 | 4-15-16 | ½ | 5th day tail bled from above hogs | Killed in 18 days, well marked |
| 659-a | 40-50 | 4-15-16 | ½ | 5th day tail bled from above hogs | Killed in 12 days, well marked |
| 661 | 40-50 | 4-15-16 | ½ | 5th day tail bled from above hogs | Killed in 21 days, wel marked |
| 660 | 40-50 | 4-15-16 | — | Control—pen exposed | Killed in 18 days, well marked |
| 662 | 40-50 | 4-15-16 | ½ | 7th day tail bled from above hogs | Killed in 11 days, well marked |
| *664 | 40-50 | 4-15-16 | ½ | 7th day tail bled from above hogs | Killed in 26 days, chronic—slight |
| 665 | 40-50 | 4-15-16 | ½ | 7th day tail bled from above hogs | Killed in 18 days, well marked |
| 663 | 40-50 | 4-15-16 | — | Control—pen exposed | Killed in 13 days, well marked |

*Excluded from summary.

When virus hogs are killed beginning six days after inoculation without noting the presence or absence of fever and symptoms, a condition will be met with similar to that shown in table X, where several of the virus hogs recovered from the inoculation. Such virus will be very apt to produce an anti-serum of low potency.

It was noticed during the experiments that quite a few of the tail-bled virus hogs recovered. These recoveries were more numerous than those occurring in other hogs from the same lot similarly inoculated but not tail-bled. However, no record was kept of this feature.

Table XII shows the number of pigs inoculated and exposed with the different kinds of blood obtained, and the average number of days which they lived.

TABLE NO. XII.

| Number of Pigs | Kind of Virus | Average No. days lived |
|---|---|---|
| 13 | Four-day tail blood | 17.30 |
| 5 | Controls (Pen exposure) | 22.60 |
| 20 | Five-day tail blood | 16.85 |
| 7 | Controls (pen exposure) | 20.85 |
| 4 | Six-day tail blood | 14.75 |
| 2 | Controls (pen exposure) | 18.50 |
| 25 | Seven-day mixed blood | 13.04 |
| 11 | Controls (pen exposure) | 17.18 |
| 9 | Eight-day mixed blood | 12.44 |
| 4 | Controls (pen exposure) | 19.75 |
| 50 | Received ½ c.c. of blood | 15.18 |
| 21 | Received 1 c.c. of blood | 14.28 |
| 29 | Controls (pen exposure) | 19.68 |

CONCLUSIONS. From this study of hog cholera blood it has been conclusively shown that there is a gradual increase in the virulence of the blood as the disease progresses from four to eight days following inoculation, and that the eight-day blood was the most virulent.

In producing virus for serum production, one may be justified in killing such hogs, beginning six days following inoculation, providing there is a corresponding high temperature and a manifestation of symptoms, especially weakness.

# NOTES IN REGARD TO HORSE LICE, *TRICHODECTES* AND *HAEMATOPINUS*

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Horses are infested with two kinds of lice, the sucking louse, *Haematopinus asini* (*Haematopinus macrocephalus*), and the biting lice, *Trichodectes pilosus* and *Trichodectes parumpilosus*. The two forms are readily distinguishable, as the sucking louse is a larger louse with a long pointed head and the biting lice are smaller forms with a blunt rounded head. (See figures.) The sucking louse, as the term suggests, is a blood-sucker. The biting louse lives on the superficial epidermal scales and the debris and secretions present on the skin. The sucking louse is probably the more vicious pest of the two, as the loss of blood from the attacks of large numbers of these lice may be a serious matter. There is probably little difference in the degree or amount of annoyance due to the presence and irritation from the two different kinds of lice, but even here the puncturing of the skin by *Haematopinus* is perhaps more irritating than the biting of the superficial epidermis by *Trichodectes*. Both forms give rise to itching, and the results from this are often surprisingly unpleasant. A barn full of horses may become a pandemonium as a result of lice. The itching animals attempt to relieve the itching by rubbing and biting, other animals start to kick, presently the kicking becomes general and there is a resultant clamor and din, with a substantial element of danger to the horses and attendants. Occasionally the lice will give rise to eczema. Lice seem to be more numerous in late winter or early spring. They are more readily detected when horses stand in the warm sunshine, as this brings the lice to the surface. The sucking lice are especially easy to detect on white horses.

Attempts to find exact published information in regard to the bionomics of the horse lice indicate that not very much work has been done along these lines. The large literature on the bionomics of the louse parasitic on man, *Pediculus humanus*, a very large part of which has come into existence since the beginning of the present war, suggests that this lack of information regarding horse lice is not merely apparent, but real. Many persons, writing on

horse lice, discuss periods of treatment, remedies, and other matters for biting lice and sucking lice together, apparently on the basis that a louse is a louse and, more especially, that a horse louse is a horse louse. But inasmuch as there is a rather wide gap between a sucking louse and a biting louse, the first belonging to the Hemiptera and the second to the Mallophaga, it might be as safely assumed that there would be considerable difference between the two kinds as regards not only structure, but also bionomics and, consequently, details of treatment. A few very tentative experiments seem to confirm this idea.

HORSE LICE

SUCKING LOUSE

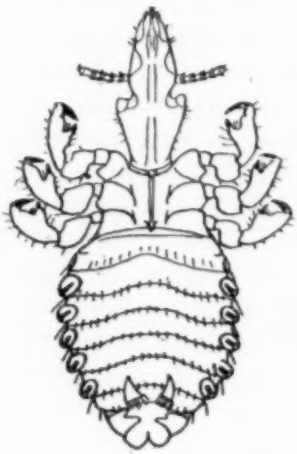

FIG. 1. *Haematopinus asini* (*H. macrocephalus*) Female. x16. After Neveu-Lemaire (1912)

BITING LICE

FIG. 2. *Trichodectes parumpilosus.* Female x14. After Neveu-Lemaire (1912)

FIG. 3. *Trichodectes pilosus* (*Tr. vestitus*). Female. x14. After Neveu-Lemaire (1912).

In the purchase of hundreds of horses for the serum work of Parke, Davis & Company, there is more or less trouble as a result of the importation of lice on new purchases, and this problem becomes more acute in winter when dipping is no longer feasible. During the summer lice may be readily controlled by dipping, a coal-tar dip furnishing a cheap and satisfactory means of freeing horses of lice. During the past winter the writer has assisted the veterinary staff at Parkedale and has undertaken a few rather simple experiments to obtain a little information which did not seem to be available. The principal object of this paper is to make

those results available to others and to make public such findings as are in any way new.

In the first place, 38 horses were selected for examination for lice, taking those on which lice had been seen or where the restlessness or evidence of itching suggested the presence of lice. Of these horses, lice were found on 24, or 63 per cent, so that of cases presenting evidences of lousiness clinically, conviction in the shape of lice found was not obtainable in quite a number of cases. Of the 24 horses found infested with lice, 22, or 92 per cent were infested with sucking lice, *Haematopinus asini*, and only 2, or 8 per cent were infested with biting lice, *Trichodectes pilosus*. The infestations with *Haematopinus* ranged from very light to very heavy; those with *Trichodectes* were both very heavy. It is interesting to note that Osborn (1891), contrary to our experience here, found the biting louse most common in Ohio at the time he wrote, and says of the sucking louse, *Haematopinus*: "Notwithstanding the probable frequent occurrence of this species, we have as yet failed to meet with examples. The biting lice from horses have been secured in great numbers, but we have searched in vain for this one." Even five years later, Osborn (1896) writes of *Haematopinus*: "The biting lice have been secured in great numbers, but we have searched in vain for this one, and but few have come to hand." As regards the species of biting lice found, we are again at variance. I found no specimens of *Trichodectes parumpilosus*, while Osborn (1891, 1896) says of *Tr. pilosus*: "We have not been fortunate enough to secure examples of this form, though we have the other in great abundance." The difference in Osborn's findings and our findings as regards the relative abundance of the two species of biting lice is paralleled in Europe, where Fiebiger (1912) has pointed out that Railliet considers *Tr. pilosus* the more rare, while Taschenberg considers it the more common of the two species. Neveu-Lemaire (1912) agrees with Taschenberg.

Experiments showed a great difference in the length of time the sucking lice could live off their host as compared with the biting lice. In a number of tests, sucking lice, *Haematopinus*, lived 1 or 2 days, the last of them never surviving beyond the second day after their removal from the horse. On the other hand, biting lice, *Trichodectes*, lived from 5 to 8 days, the last of them being found dead on the ninth day. One factor which may partly account for this is the fact that both species of lice were kept in vials with small

amounts of the horse's hair, removed when the lice were collected. This hair perhaps furnished food for the biting lice, while the sucking lice, deprived of the blood which constitutes their food, speedily starved. In spite of this, the experiment indicates that stables are apt to be capable of infecting horses with biting lice for a period of at least 8 days, at the temperatures noted below, even disregarding the presence of eggs, whereas stables would probable be incapable of infecting horses with biting lice after being kept empty for 2 or 3 days at these temperatures, if we disregard the presence of eggs. The presence of eggs in stables would depend largely on whether the horses involved were shedding or losing hair in other ways. There would seem to be little likelihood of the eggs becoming detached from the hairs. Newly hatched lice of either the biting or sucking kinds died inside of two days when kept off a host animal. I have no data in regard to the humidity conditions of these longevity experiments, and only the temperature range, which was from 21° to 31° C. (70° to 88°F.). The lice would probably live longer at lower temperatures.

Louse eggs may be readily distinguished from the eggs of the bot-flies by the fact that lice attach their eggs to the hairs at a point close to the skin, so that they are not easily seen unless the hair is parted to look for them, whereas the bot-flies attach their eggs on the hairs at a point remote from the skin. Bot-flies commonly attach their eggs to the hairs, and especially the long hair, of the fore-legs, shoulders, nostrils, chin and mouth, places readily accessible to the mouth of the horse, since the larvae must get to the stomach of the host. In our experience, lice eggs were most common in the flanks and around the angle of the jaw, the latter a point not accessible to the mouth. The eggs of lice and bot-flies can be further differentiated by the fact that the louse egg is a symmetrical affair, the cap of the egg rounding off the unattached end like the lid of a barrel, while the bot-fly egg is asymmetrical, the cap of the egg being set obliquely to the longitudinal axis of the egg. The bot-fly egg is transversely striated, the egg of *Haematopinus* is finely stippled, the stippled dots being at the intersections of a network of lines, and the egg of *Trichodectes* is smooth. The eggs of *Haematopinus asini* are an opaque creamy white, 1.2 to 1.27 mm. long and 530 to 540 $\mu$ thick, measuring mounted specimens and excluding the adhesive mass that attaches the egg to the hair. The eggs of *Trichodectes pilosus* are daintier, more translucent affairs,

with an iridescent sheen, and are smaller, 830 to 880 $\mu$ long and 390 $\mu$ thick. Louse eggs are usually attached to one hair, but an occasional egg is found attached to two hairs.

A few experiments were undertaken to determine the length of time required for the hatching of *Hematopinus* and *Trichodectes*. In these experiments, eggs were collected from horses and kept in Petri dishes under atmospheric conditions of humidity and temperature. The humidity factor was not ascertained; the temperature range was the same as that for the longevity experiments, 21° to 31° C. (70° to 88° F.). The length of time the eggs had been on the horse was, of course, unknown, so that the periods obtained only serve to show that eggs may require that much time to hatch; they may require longer.

In the case of *Trichodectes pilosus*, eggs hatched in the course of 5 or 6 days. A majority of the eggs remained unopened at the end of 50 days, the young lice being found dead and shriveled within the shell at the end of that period.

In the case of *Haematopinus asini*, eggs hatched in the course of 10 to 18 or 19 days. The large majority of the eggs which were unopened when collected remained unopened at the end of 50 days. These unhatched eggs were dissected open with the following findings: About 66 per cent of the young lice were dead and shriveled; about 13 per cent were dead, but well preserved instead of shriveled; the remainder, about 21 per cent, appeared to have undergone autolysis, the egg content being fluid and unorganized. It appears likely that the failure to hatch on the part of the large majority of the eggs tested is to be attributed to unfavorable incubation conditions rather than to any common tendency to fail to hatch under normal conditions. On the other hand, the examination of large numbers of eggs collected from horses showed a majority of these eggs to be already opened, so that in a given collection of opened and unopened eggs, the unopened ones presumably include those functionally incapable of maturing or opening, which defective eggs would persist on the horse for long periods.

The length of time required for maturation of the lice on horses was not ascertained and I have been unable to find this point covered by definite experiments in the literature available to me. This is data that should be available before one can speak with certainty as to the proper intervals for dipping. Since the dips used kill the lice, but not the "nits", we must know the time re-

quired for a female which hatches right after dipping to become mature and deposit eggs, for this is approximately the period during which we may postpone dipping. We must not postpone it until the female has actually deposited eggs. The other time factor concerns the length of time required for eggs to hatch. After the first dipping we must wait until the egg deposited just before that dipping has hatched in order to kill all the lice emerging from eggs present at the time of the first dipping. The relations of the hatching period and the period of maturation determine the intervals between dippings and the number of times it is necessary to dip. Since the maturation period for horse lice is not known to me, the procedure indicated for dipping, on the strength of the scanty knowledge available, would be as follows: for sucking lice, if animals are only to be dipped twice, dip at intervals of about 3 weeks; if they may be dipped three times, dip at intervals of about 2 weeks, to eliminate the likelihood of a short maturation period resulting in egg production before the latest of the eggs present at the first dipping had hatched. As a rule, however, the sucking lice mature in 3 or 4 weeks, according to Herms (1915), and practical experience indicates that two dippings are usually ample for lice. On the other hand, the statement by Herms that sucking lice hatch in 5 to 6 days is apparently not true of *H. asini*. The same authority states that biting lice hatch in 5 to 8 days, which accords very well with our findings, and mature in 3 to 4 weeks. Under these conditions, horses should be dipped for biting lice twice at intervals of 10 to 20 days, probably 2 weeks being the safest interval. For 2 dippings, where both kinds of lice are present, an interval of about 20 days appears to be indicated.

The writer appreciates that studies of this sort should be completed and well rounded out before publication if possible. It does not appear possible to complete this study at this time, as this experiment work was only incidental to eradication work, and in view of the shortage of readily available data on this subject it seems advisable to make even this tentative contribution. Moreover, as noted later, the present war calls for all available information along the line of lice control.

As noted earlier in this paper, writers habitually discuss treatments of horse lice as though no distinctions between biting lice and sucking lice need be drawn. I take it that this is due in part to a lack of available detailed information, especially in regard to the

bionomics of these insects, on which to make distinctions. The small amount of work that we have done suggests that even in the use of dips, a treatment commonly regarded as equally effective against *Haematopinus* or *Trichodectes*, there are differences worth considering, not only in the preferred intervals for dipping, but also in regard to the relative resistance to dips and other insecticides. Tests which are yet incomplete and which will be covered in later papers indicate that *Trichodectes* is more resistant to insecticidal treatment than is *Haematopinus*.

A distinction between the effects of treatment on sucking lice and on biting lice of horses which does not appear to have been sufficiently emphasized is the fact that even contact insecticides may be simultaneously "stomach poisons" or ingested insecticides for biting lice. When the horse's skin and its hairy covering is soaked with a dip or covered with a contact insecticide of any sort, it contaminates the food of the biting lice, so to speak, and subjects them to any toxic action arising from ingesting these substances. In this way it may happen that biting lice might survive dilutions of contact insecticides that would kill sucking lice, and yet fall victim to these contact insecticides as a result of their actual action as stomach poisons. As matters stand, we would not recognize this action and would regard the death of the biting lice, which might follow the dipping rather closely, as the result of the insecticidal action by contact. This matter deserves investigation.

Along this same line, the writer would like to record the result of tests of an ingested insecticide on horse lice. In the Annual Report of the Chief of the United States Bureau of Entomology, issued in 1916, Dr. L. O. Howard notes that the work done in that bureau has demonstrated that all the species of lice infesting poultry may be readily destroyed by the application of a very small quantity of sodium fluoride. Sodium fluoride is one of the common stomach poisons used in combating such insects as roaches, and is the base of many roach powders. The method of using sodium fluoride for chickens is given by Bishopp and Wood (1917) as follows: hold the bird by the legs or wings and put a pinch of sodium fluoride on the head, one on the neck, two on the back, one on the breast, one below the vent, one on the tail, and one scattered on the underside of each wing when spread; or dip the bird in tepid water containing ¾ to 1 ounce of commercial sodium fluoride, or 2/3 of an ounce of the chemically pure material, to each gallon of water.

There does not appear to be any reason why sodium fluoride should not be as effective for the biting lice of mammals, species of *Trichodectes*, as for the lice of birds, all of which are biting lice belonging to various genera of Mallophaga. In order to test this, however, one of the two horses infested with biting lice was treated with sodium fluoride, the powder being taken in handfuls and rubbed into the hair practically all over the body. The other horse was treated with a contact insecticide. Both horses were very lousy before treatment and both were completely freed of lice by their treatments. A number of other horses infested with sucking lice were also treated with sodium fluoride, while others were treated with various contact insecticides. The sodium fluoride treatment, as was expected, was not successful in destroying sucking lice. While a single experiment with one horse would not of itself establish the efficacy of a treatment, the fact that this success is in accord with the other known facts in regard to biting lice and their treatment makes a rather strong case for this treatment, and without caring to say that its value is established beyond question, we have no hesitancy in saying that it is probably as effective as the experiment indicates and is worthy of trial.

The sodium fluoride treatment has the advantage of being applicable in winter and it apparently does not injure the hair or skin. It has the disadvantage that it is only applicable to biting lice and that a horse covered with powder is not very attractive or even useful in some ways for the time being.

Methods for the control of lice are of special interest at this time. The bringing together of large numbers of horses from all sorts of places in war times habitually results in a rapid spread of these pests and great annoyance to the horses. This, in time, results in trouble for the cavalry and field artillery and work for the army veterinarian. And right now many of us must regard ourselves as potentially army veterinarians. If the present war makes the demands on this country which already seem possible, there will probably be a need for veterinarians in and out of the army that will require some stretching of our abilities to fill. In view of the importance which the subject of lice control may assume in the near future, I venture to summarize here a few of the control measures which may prove useful.

Obviously, the first control measure is directed against the lice present with a view to killing them. Lice are not especially

difficult to kill. The coal-tar dips are cheap and effective, and are the things most commonly used in this country. The Prussian army uses the following: Infusion of tobacco (1 to 25 or 30), with or without the addition of vinegar, which treatment has the disadvantage of being poisonous; sabadilla vinegar, also poisonous, and to be used well rubbed in at infested spots only; fish oil, which may be used in the same way; 1 part of petroleum to 10 of methylated spirit; equal parts of petroleum and rape-seed oil; 2 to 3 per cent watery solution of creolin or 3 per cent solution of liquor cresolis compound; grey mercury ointment, not over 150 grains at one application, rubbed over the entire body, either alone or mixed with oil or soft soap, taking care to keep it out of the eyes; or, in case of need, washing the horse with soapy water and, while the coat is still damp, dusting on finely sifted beech ashes or peat ashes and brushing in well. Inasmuch as soap is a good insecticide of itself, it is likely that some relief could be obtained by the use of strong soap-suds if nothing better was available. Louse powders, containing oxytoluol, crude cresol, naphthalin, pyrethrum, sulphur and other more or less insecticidal substances, may be used. They have the advantage of being available in winter weather when dips cannot be safely used as a rule; they have the disadvantage noted in the discussion of sodium fluoride of temporarily detracting from a horse's attractiveness and usefulness and are not such effective and simple contact insecticides as dips. The sodium fluoride treatment, as already noted, may be used against biting lice.

Aside from killing the lice present, there are certain prophylactive and adjuvant measures of value. Clipping horses is a great aid in lice control. Plenty of brushing and currying is another aid. Dipping the curry comb and brush in kerosene or a strong coal-tar dip when leaving one horse and passing to another is a measure of value in preventing the spread of lice; due regard must be had for the potential danger of kerosene as a source of fire loss in a stable, and for the fact that kerosene is depilatory for horses. Also, too strong coal-tar preparations irritate the skin. Shake off the excess kerosene or coal-tar preparation after dipping the comb or brush. Where horses can be curried on a picket line, it diminishes the danger of reinfection from lice and eggs which are cleaned off, since these are more apt to perish out of doors and not return to their hosts than would be the case with lice in a stable. It also diminishes the fire risk in using kerosene. The danger of trans-

mitting lice on saddle blankets, horse blankets, and bridles has not been well investigated or reported; the danger exists but it is uncertain whether it is considerable or negligible. To be on the safe side, these things should be regarded as carriers of infestation and treated accordingly. Cleanliness is almost always valuable in the control of parasites. Clean stables, frequently whitewashed or washed down with preparations of germicidal and insecticidal character, are safer than dirty stables. The prompt and frequent removal of manure and stable litter is a measure of value. Segregation of badly infested horses and quarantine measures for new animals are measures that are indicated when feasible.

It is interesting to note that a number of European investigators have stated that one way to remove the human body louse from clothing is to put the clothing on a horse. Some writers advance the theory that there is something insecticidal about this treatment and about horses. One of these writers makes the following statements: lice are rare on horses; baker's assistants protect themselves against fleas by putting their sleeping clothes with the coats of the stable hands; the Ruthenian people put their clothing over horses to get rid of lice; dogs roll in horse manure to get rid of fleas. Another writer surmises that the efficacy of the system of putting the clothing on horses is not due to a repellant odor, as stated by some, but to the lice abandoning the clothing to get on the horse for warmth and nutrition, and then perhaps being killed by the impalpable and irritant powder from the skin. These surmises are interesting without being entirely convincing. Having seen thousands of lice swarming over horses, it is hard for us to believe that a horse is an insecticide. Still it is conceivable that the human louse (Nuttall states that there is no dependable morphological difference between the head louse and the body or clothes louse), if transplanted to a horse, might die of something akin to gastralgia or even nostalgia.

In conclusion, I would like to acknowledge the courteous assistance and cooperation of Dr. R. H. Wilson and Dr. L. A. Maze in the conduct of the experiments noted here.

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# ITEMS IN RECENT HISTORY OF VETERINARY MEDICINE*

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I suppose that the honor of my appointment to serve on this committee may have been conferred because I was one of the oldest graduate veterinarians in the United States. As a matter of fact, I entered Edinburgh Veterinary College in November 1854, nearly 62 years ago, I graduated from that College in April 1857, which will count 60 years next spring. If superannuation is a winning card in this case, I may add that I had to retire *emeritus* from my university position in 1908 on attaining the mature age of three score and ten, and five years later than the rule of the university required (65 years of age).

Going back to 1854, when I entered college, you will naturally look with a sense of pity on the poor student deprived of the helps that have become common in this advanced twentieth century. The founder and director of our college (Professor William Dick) had been the son of a blacksmith, but, like many another iron-worker aspired to something higher, and sought learning at the still young Royal Veterinary College in London, founded in 1792. I found him a rosy-faced old bachelor, with a large head, a self-confident look and a halo of steel-gray hair standing out equally all over and giving the head the appearance of one double the size. As text books in English we had, besides Dick's treatise, Percivall's Anatomy, and his seven volumes on Veterinary Medicine, Youatt's books one each on the Horse, Ox, and Sheep, Skel-

*Dr. Law's manuscript, as a report of the committee on Veterinary History, was received by the editor with the information that it was sent to the Detroit meeting too late to be acted upon.

lett on Cattle, Stewart on Stable Management, Morton's Veterinary Pharmacy, Dunn's Veterinary Medicines, and finally Blaine's Veterinary Art. Those acquainted with French could avail of the works of Delafond, Chauveau, Lavocat, Renault, Leblanc, Sanson, Verheyen, Delwart, Colin, Lafosse, San Cyr, Rey, Bouley, Regnal, and a host of others; in German the splendid works of Gurlt, Schwab, Hertwig, Hering, Heusinger, and many others were available. All in all the earnest student had no lack of material for profitable study. It is true that the day had not yet dawned for the study of pathogenic microbes, of microbian diseases as such, of antiseptic surgery and operations, of the suppression of animal plagues and their extinction by rigid quarantine, seclusion or slaughter, nor of immunization from such pestilences by artificially increasing the intolerance to the germ and its products in the invaded subject. And yet we could already trace the dim conception of such coming triumphs, and the prophetic reaching after the coming results by the restless human spirit. I shall always remember it as one of my greatest privileges that I met Joseph Lister (afterwards Lord Lister) and attended his surgical class in Edinburgh when he was already laying the basis of modern antiseptic and aseptic surgery. Henri Bouley whose acquaintance I made a little later gives a fine example of the then imminence of this surgical awakening in his article, in his great Dictionary of 22 volumes, on Castration by Bistournage of bovine animals with loose pendent scrotum. This is simply a twisting of the spermatic cord without wounding the scrotum, or admitting the entrance of outside germs to start infection, suppuration and all attendant dangers. The crushing of the testicle by blunt mouth pinchers acting through the unbroken skin as a second early example of avoidance of the entrance of pathogenic germs at the seat of a surgical injury. And yet this wise foresight of our early predecessors seems to have been entirely overlooked by our modern bacteriologists and surgeons.

Another example of this foresight we have in the early inoculation of pathogenic virus where the lack of a free supply of blood and lymph and with but a meagre amount of loose open connective tissue, it cannot find a congenial home, nor arouse dangerous and destructive disease processes. It has long been an aphorism that the virus from lung plagues placed subcutem, behind the elbow or elsewhere where loose connective tissue abounds, can only be done "under pain of death". But its insertion in the tip of the

bovine tail, where no loose connective tissue exists, produces only a slight inflammation and swelling, which can be easily controlled and yet is sufficient to immunize that animal against any subsequent exposure to or inoculation from lung plague. Similarly the inoculation of blackleg on the tip of the tail produces only a circumscribed and easily controllable local disease but fortifies the animal operated on against taking blackleg from any future infection. In both of these diseases the germ finds difficulty in survival in the circulating blood and it is only where it can produce an excessive liquid exudation and thereby compress or even obliterate many of the blood vessels and lymphatics that it can survive and produce its habitual deadly action. The interesting point is that the then densely clouded human mind penetrated its besetting fogs and conceived the possibility of a great good, though the world had still to wait long and patiently for the full elucidation of the modus operandi by which the benefit was brought about. It is easy to adduce other instances of the exercise in the early days of a sound judgment in the restriction and extinction of plagues of animals and men, long before the modern recognition of the microbian causes of the pests. Among these is the setoning of young cattle to prevent blackleg, the benefit coming from the attendant suppuration and purulent discharge which kept the wounds exposed to the air and lessened the violence of the blackquarter when inevitably started in such quarter-ill-infected districts. So also when the widespread practice, in sheep-pox districts, of inoculating from mild cases of the disease so as to pass all through a non-fatal yet immunizing attack. This sheep-pox immunization probably originated from the small pox immunization of men long practiced in Arabia, Persia and China and introduced into western Europe by Lady Mary Montague. Prior to this small pox had been universal. The most impressive example is that of the successful extermination of rinderpest in Great Britain in the middle of the 18th century in the absence of all knowledge of bacteriology. From the beginning of the century rinderpest had spread over Europe in connection with the wars of Peter the Great and later military leaders and in 1715 and again in 1745 it reached England where in three years it swept off 3,000,000 head of cattle. It was finally brought to an end by stopping all movement of cattle in infected districts, and by the slaughter and deep burial of all cattle in infected herds, followed by thorough disinfection of the farm build-

ings. It was only in May, 1865, that the disease made another eruption into England when the public mind had lost all knowledge and memory of the three years scourge of a century before. High class medical men, dignified officials, and others vied with each other in advocating all sorts of specifics and remedies. Even my now venerable preceptor, the founder of Edinburgh Veterinary College, entered the lists and prescribed for the cattle attacked, and when this prescription was proved useless, as shown by the ever increasing number of deaths, advocated the formation of quarantines where the victims could be segregated and treated until recovery or death. Deaths continued greatly to predominate. Prof. Dick found himself in a most unenviable position. He had indoctrinated his students that "Veterinary Medicine was only a system of Common Sense", a plea that none could rationally dispute. The only question was whether in the matter of rinderpest, he had not himself parted with his common sense. But he went further, he had assured us that rinderpest was a mere result of impaction of the manifolds, and, that its transmission by contagion was all a delusion. For the first time in his life he was now confronted by the Russian cattle plague and could not close his eyes to the fact that it was as easily communicated and as fatal to the slop-fed dairy cows of the large cities and the turnip-fed steers, which were continually in a state of mild diarrhea, as it was to the hay and grain fed steer, or growing heifer. His trouble was that he had won over to the doctrine of the great Sydenham and others, that epidemics were caused by conditions of the air and earth, and with which contagion had very little to do. He gleefully told his class of an Edinburgh lady bringing him a favorite dog, and when he had satisfied his esthetic soul by feasting his eyes on the lady herself and had turned to the canine patient which had been meanwhile licking his scratched hand he found to his horror that the dog was mad. He did not, however, contract hydrophobia and congratulated himself that he had now secured another and stronger proof for his favorite theory. To us, who had never yielded to Sydenham's dogma, it had the effect only of a warning against attaching undue importance to an unessential accessory influence which might secondarily affect the progress of a disease which it was powerless to produce. To you who have grown up under doctrines and demonstrations of microbiology such a warning would be scarcely needed. In view, however, of the present conditions of

world politics and war everyone should carefully avoid every ten-tendency toward letting non-essential matters or considerations dominate the mind so as to beget an obsession that will render impossible just judgment as to what will best serve the interests of humanity, civilization and progress.

RINDERPEST. Rinderpest furnishes an example of a disease which, out of its native home in Asia, and among cattle, other than those primitive and aboriginal to that native home demands most vigorous and inflexible measures for its extinction, and where the sanitarian should never rest satisfied with a resort that comes short of thoroughness and effectiveness. The following are among the reasons for this course:

1st. Incubation is short, usually four days, a rise of temperature being usually present after the second day. In the plains of India the latency is very much longer, due probably to insusceptibility in races of cattle long habituated to the plague, so that susceptible strains have been killed out.

2nd. The number of races susceptible. Cattle are not alone receptive to the disease but all ruminants and at times pigs are liable to take and carry it.

3rd. The virus—an ultravisible filterable one—is transferred from animal to animal with great readiness. Man, horse, dog, cat, mouse, rabbit and bird are immune, but can carry the virus.

4th. Flies, bugs, acari and ticks, also the many parasites can carry infection.

5th. Harness, halters and clothes carry virus.

6th. Virus can blow on air, on light objects, hay, straw, fodder, hair, wool, feathers, leaves, down, dust, etc., without losing its virulence.

7th. The virus is present in the body in all its secretions and excretions, feces, urine, milk, nasal and oral mucus, tears, sweat, dandruff, ear wax, sebum of prepuce and vulva, hoofs, horns, etc., blood and pathological exudates.

8th. The fetus, fetal membranes and discharges are infecting.

9th. The virus does not easily nor quickly part with its potency, so that when dried and salted in hides it is usually harmless, it yet remains infecting on stalls, mangers and racks in darkness and stillness, for three months, (Müller, Dieckerhoff) in feces for one month (Bouley) to five months (Krajewsky), in dried bones for one month, in hay packed in a barn three to four months

(Haubner, Dieckerhoff), in blood in a sealed glass tube one month (Semmer), in glycerine 8 days (Edington), and in fresh flesh four days (Arloing). Thus when secluded from light and air its destruction becomes very problematical.

10th. When inoculated on animals of only slight susceptibility as on camels, dromedaries, buffaloes and swine or on the less receptive ruminants in the aboriginal home of the plague, its eruption is liable to be delayed and the attack mild so that the cases of this kind may receive little attention or even recognition, and a wide extension may occur without requisite control.

11th. Rinderpest is so readily transmitted to susceptible races of cattle, and attacks them so universally when exposed, that the herds attacked are speedily exterminated and any neglect or slipshod administration in dealing with it is to the last degree ruinous. The sale of inferior meat at a freibank, so long continued in Germany, was a distinct invitation to the extension of this as of other contagious diseases.

My practical acquaintance with the disease began in 1865 in Great Britain. Imported from Revel, Russia, a cargo of cattle was landed at Hull, May 29th and sales made to go to London, Derby, Leeds, and many other places. Early in June sickness appeared and spread rapidly in places where these cattle had been taken, and by the end of July the infection was seen and recognized among other places in Edinburgh and even as far north as Aberdeen. The deadly nature of the disease drove owners and purchasers of exposed cattle to turn them again on the market, so that the infection spread with daily growing rapidity. In their dire extremity the stock owners blindly resorted to any brazenly lauded remedy, however absurd, and as the father of veterinary medicine in North Britain had long treated Russian cattle plague as a hoax, they could hope for little from him. The overwhelming nature of the calamity made even him prescribe for it, and, when his remedies proved, if possible, even more useless than those of the quack and M. D., he attempted to save his face by advocating a quarantine where all sick cattle could be secluded. They were accordingly removed to this asylum on foot, or in wagons, open or closed, spreading infection in their way, overcrowding the hospitals and making it within a few days an abode of the dead only, in place of the living, and a charnel house of concentrated infection. As my former preceptor and friend John Gamgee was absent in London, I had to

stand in the breach and beside an occasional letter to the "Scots man", I contributed a long series of weekly articles to the "Scottish Farmer" which were widely read and highly appreciated. These contributed to enlighten the stockowners of the North as to the nature of the imported epizoötic, its dependence on contagion only, its deadly course, and the utter futility and folly of relying on medicinal treatment, or any kind of segregation which involved the movement of exposed and infected animals or their products from place to place. I became of course, the butt of many angry and would-be wise sayings by those connected with cattle traffic and was often reminded that "your business is to cure and not to kill". The critics could not see that the real slayer was the deadly plague and that unless its greedy maw could be shut, the splendid bovine stock of England was to be practically exterminated, and the much admired and envied English Agriculture virtually abolished for a length of time. They could not see nor appreciate the continued immunity of continental countries and territories that bred and exported their indigenous cattle never brought outside cattle within their own land. But surely they could have opened their eyes and their minds to the fact that countries that raised their own aboriginal bovine races, and sold them outside but never admitted strange strains of blood, remained uninfected and untarnished throughout, while those that kept up a trade from without, were plunged early and persistently into the throes of the pestilence until all cattle had been cut off, or the survivors had recovered, themselves immune; and when their infecting products had been sterilized by disinfectants or exposure, before the next crop of calves arrived, these remained safe and harmless. Thus throughout the 18 months of its prevalence it scourged but two counties (Denbigh and Flint) in Wales, out of a dozen. In England, the county reports issued weekly by the government show a long continued immunity of those shires situated out of the line of cattle traffic, and above all of such as raised an exclusive race and never imported cattle of any kind. The lake country, (Westmoreland) long remained free. Scotland offered a still better illustration of the disastrous effect of cattle trade during an epizoötic. The counties of Wigtown and Kirculbright, the aboriginal and exclusive source of the famous Galloway cattle reported not a single case throughout, and the same was true of the mountainous and island uninvaded native home of the West Highland Cattle, Argyle, Bate, Inverness, Nairn,

Banff, Moray, Ross, Sutherland and Caithness. The great islands of Scotland, (Hebrides, Orkney, and Shetland, like the Isle of Man and Ireland) were similarly spared. The Channel Islands, which rigidly exclude all but their own treasured primeval stock, completely escaped this as they did all other bovine plagues, before and after. Such a record for those who kept open eyes and mind, settled for all time the causation by contagion, or better, by an organized, self-multiplying and self-propagating germ, as yet undemonstrated by microscopic or staining methods, but an allsufficient reason for devoting every effort to the extermination and later to the exclusion of this as yet unseen cause. A century earlier Great Britain had been forced to this conclusion by the stern logic of effect and cause, and had driven out the invader from her fields and shores by rigid seclusion, killing and sterilization. Once again she saw the light and in defiance of all protests of commerce and trade, she once again banished the pestilence from her herds. The highest weekly attacks mounted to over 17,000 head, the invaded herds numbering 37,774 animals and, as practically all such herds suffered, and 90% died, it bade fair to make an end of British cattle. All movement of cattle, sheep and swine in infected districts was forbidden, all infected animals killed and buried, all visitors were debarred, and all buildings, yards, stockcars, etc. disinfected. The effect was to at once greatly reduce the weekly record of new cases and very soon the pest was a thing of the past. The very nature of the disease strongly contributed to this success; the mortality rendered concealment impossible, any disposition to hide hastened infection, and filled the buildings, yards or pastures with the dead; the herd was doomed in any case and violation of the law forfeited the claim upon the government for indemnity. There was no temptation in this case, as is constantly present in less fatal diseases, to violate the law, and the statute operated without a drawback.

Immunization. The latest resort, however, to be adopted in this enlightened age is to immunize the stock by individual inoculation. This is an advance truly. But as in the case of all other plagues the question rises is it a purely beneficial advance in the case of this disease, without any attendant drawback dependent on qualifiying conditions inherent in or surrounding the animals operated on, and on other animals that they may later infect? Long before the days of microbiology, microprophylaxis or microbio-

logical therapy, before man thought deliberately of artificial immunization at all, they had reached the conclusion that the ideal methods of dealing with rinderpest was to exterminate the cause from a country, or better still, from the face of the whole earth. This, and this alone, could save our future livestock, for all time, from its depredation and from the ruinous losses that must otherwise recur from time to time whenever control went napping, in the face of the continued existence of a deadly plague that it had been at all possible to stamp out. Would it be economical or uneconomical to devote other animals to the production in their systems of the protective microbes, its toxin, opsonins and the resulting defensive materials, to intelligently inoculate each particular animal and to see that due care is taken to prevent the escape of anything that then or later may prove injurious to other animals? The preservation of the animal inoculated is not by any means, the only thing to be considered, and the man who stops at this is by no means a safe person to entrust with the direction or administration of the inoculation. Let us consider the immunization from rinderpest in the light of the above consideration. The methods already worked out are: 1. The fresh bile method. 2. The glycerinated bile method. 3. The method with serum immunized and virulent blood. 4. The method with serum of immunized and subsequent exposure.

1. The fresh bile must be obtained from an affected animal on the sixth or eighth day of illness and must be absolutely free from blood. The animal furnishing the bile must therefore be sacrificed to furnish the material, or at least its life must be most seriously imperilled. A dose of 10 c.c. does not immunize the inoculated under ten days and not always then so that a second dose on the next day, became requisite, followed, two weeks later by a small dose of virulent blood, which on its part often proves fatal.

2. The mixed bile—(glycerine 1 to bile 1)—in a dose of 20 to 50 c.c. had also to be followed a few days later by a small dose of virulent blood. But this too, often failed, so that in both cases alike there is a serious outlay, a long continued risk of escape of infection, and a very uncertain result.

3. Simultaneous method—the inoculation at one time on different parts of the body, of the blood serum of an immunized animal and the virulent blood, requires the same long continued watchful care of infected animals, with attendant risk of escape and

diffusion of infection, to be followed by a new outbreak whenever this reaches a susceptible herd, and by a maintenance of the pestilence for all future time, in place of a complete extinction, which economy and sanitation demand. In cases where immunity is secured it begins not sooner than fourteen days after the inoculation whereas in an infected herd the disease is contracted at once, and incubation is passed in two to four days.

4. The serum alone (sterilized serum) method, if truly serum alone and that *sterile*, would be safe apart from the risks attending on its preparation, but the rule is laid down to mix the infected animals at once with diseased animals so as to infect them at once and pass them through a mild, non-fatal form of the disease, when they will resist any new invasion for several months.

We find therefore that all forms of immunization recommended are but so many means of passing the animal through a mild form of the disease with the attendant dangers of the extension and perpetuation of the infection. Is it too much to say that rinderpest can never be got rid of in this way? But, all of these methods have, or ought to have reference to the plague as already existing in the herd when the disorder will be contracted inevitably and when, or if, the animal recovers it is of necessity immune. No one of them ought to be applied to herds nor districts, in which the infection is not already present.

Aphthous Fever. Foot-and-mouth disease. I select this pest as being a close counterpart of rinderpest in its extreme contagiousness, its rapid and almost infallible extension from one victim to the next, its short incubation 2 to exceptionally 6 days and its rapid progress to a climax—4 to 6 days—: it differs from rinderpest in its minor manifestations, the fever being materially lowered when the eruption appears, and, if kept free from filth and physical or chemical injury, in its rapid recovery, the illness being usually over in 8 to 15 days. Fever may run high in the first two days but is lowered as eruption appears and unless local sores are aggravated by mismanagement is soon barely perceptible.

The local lesions may show wherever inoculated but are usually confined to the mouth, teats and feet, or to one or two of these parts and this localization is almost pathognomonic. When implanted in the nose, by the prehensile tongue, it develops on the muzzle and nasal mucosa as well, and when swallowed in milk or fodder the fourth stomach and bowels suffer, usually with a fatal result. But this latter is very exceptional.

*Aphthous Fever* further contrasts with rinderpest in the variety of animals susceptible. While cattle, sheep, and swine are the main sufferers, all cloven footed animals, wild and tame, are subject to it, and man has very often suffered even from the intestinal form, in consequence of drinking the milk or consuming the butter or cheese from an infected dairy. Horses, dogs and cats are less susceptible, though in New York in 1870 stomatitis developed in these and even in chickens consuming the warm milk. On the European Continent, where the disease is constant, and immunity likely, these latter animals failed to contract the disease by inoculation.

The *diagnosis* of the affection is not difficult to the experienced observer, the introduction to a herd or premises of one or more strange animals from a suspicious source, followed by a sudden and rapidly increasing number of cases of sickness, with high fever, hot, tender mouth, froth around the lips, drivelling of stringy saliva, redness of the buccal mucosa, and the appearance of red spots followed by blisters on the inside of the lips, gums, tongue, and it may be the cheeks and soft palate, these vesicles covered by a whitish or grayish epithelial envelope and later when the blisters have burst, each shows a red, raw base more or less rounded, or irregular by coalescence of several bullae. At times the entire tip of the tongue is one uniform red, angry sore. A marked feature is the "*smacking of the lips*" or rather of the tongue and palate, audible at some distance. When udder and interdigital spaces are involved, similar blisters show on the hot, burning teats, and in the arch between the hoofs, attended by shrinking when the teats are drawn, and lameness when moving. A striking symptom is the stretching out backward, and shaking, of each hind foot in turn, as if to dislodge some irritant. The blisters in these two last situations are early ruptured so that what is usually seen are rounded sores or scabs on the teats, and an open sore from back to front of the whole interdigital arch.

The simultaneous attack of mouth, teats and feet is very diagnostic, and this usually occurs in dairy cows; in heifers the teats may be omitted, and in sheep and pigs the eruption may be apparently confined to the feet, the mouth and teats being largely respected, or so slightly attacked as to be easily overlooked. But the fact that cattle, sheep or pigs have usually been brought in from a strange place, from market, or highway, and that cows,

sheep and pigs, if herded together, have been simultaneously attacked is very characteristic of the disease, and the *"smacking"* by the cattle, and the nature of the blisters on close examination, make a conclusive diagnostic picture. There should not be a mistake unless the attack is still so incipient that the blisters are not yet clearly formed, or unless they have already broken and largely healed, when they may be confounded with ergotism or other cryptogamic sores, with those of bacillus necrophorus, with streptococcic cellulitis, with common foot rot in cattle and sheep, with cowpox, with vesicular emphysema of breeding cattle, with actinomycosis of the tongue, and with a dozen other injuries and diseases. I may be told that one must not be too particular when fighting an animal plague but must kill the suspected beast, or beasts, and bury them, *"the dead tell no tales"*, and our blunder is not going to spread infection. But it may sometimes do worse. In 1884 I had to stand in the breach when a number of herds, in three stock-breeding states, and suffering from *gangrenous ergotism*, had been condemned for foot-and-mouth disease and the states quarantined in consequence. For the sake of sceptical professional brethren, as well as for the state officials and stockowners, I staid long enough to demonstrate by inoculations that neither sheep nor swine were susceptible and had the satisfaction of seeing the embargo quarantine raised, an open harmless cattle traffic restored to the states involved, and the stockmen informed as to the *real* danger, causes and prevention of ergotism. Yet at not infrequent intervals I see the statement repeated in public prints that Illinois, Missouri and Kansas suffered an invasion of foot-and-mouth disease in 1884. Those shortlived quarantines, though withheld from their full evil results at that time, still remain on the books as matter of record, and for all time to come the undeserved slander will be repeated against these territories.

On another occasion, in 1908, I stood beside a long trench dug for interment of a large herd which had been drawn from several states, and were now supposed to be infected with foot-and-mouth disease.. This herd had chronic lesions in the mouth, with white necrotic margins, such as come with mycotic invasion from faulty fodder, but without any active inflammation, with no fever and with no observable lesions elsewhere. Fortunately the order for their slaughter was held up until another diagnostician had passed upon them, and as his decision was justified by the

negative result of inoculations, and of inquiry into their antecedents, and the sanitary condition of the states from which they came, the sentence of death was revoked and the cattle of the states furnishing them were saved from quarantine and ruinous depreciation. Had the sentence been executed and had the herd gone into the ditch of condemnation, an indelible stain would have been put on every state from which any member of the herd had been drawn and no one can calculate the resultant losses to such states. A succession of cases of this kind cannot fail to ultimately throw discredit upon a worthy profession, and indirectly on all scientific work. Science is knowledge, and true science cannot be dissociated from justice. The charlatan may hoodwink the public for a time, but the day of reckoning comes sooner or later; knowledge and truth can alone raise a good and permanent construction.

Drawbacks to Slaughter as a Measure of Sanitation. The wisdom of an uniform slaughter of infected herds must always rest on the nature of the pestilence, its infectivity, and its inherent fatality. Slaughter was early and successfully applied to rinderpest and lung plague, both diseases with a large mortality, and the latter with a very prolonged incubation, and, in cases of recovery, a tardy return to health on account of the necrotic sequestra in the affected lung. When we turn to *foot-and-mouth disease* we find that the affection is mild and of short duration, while death is all but unknown when the victim is placed in otherwise good hygienic conditions.

*Death rare.* From the importation of the foot-and-mouth disease into the British Isles in 1839 to its extinction in 1886, the deaths from it were practically negligible. In Scotland, the rule was for farmers to purchase their steers at the Fall market in November, and as all approached and left the market over the highway, and as all entered and left the field by one or several narrow gates, over ground puddled into a mortar-like mass, it was rather exceptional that any herd escaped infection. On reaching the feeding farm, they were usually turned into pasture, where in the first week they showed the disease. By the end of the second week, if the weather was inclement, they were turned into the feeding yards and boxes, until they came out fat in the spring. Losses were unknown to the farmer. There was of course some loss of weight during the two weeks of illness, usually the first only, but that was soon made up when they came on turnips and linseed

cake. The average gain in the feeding pen was two pounds daily. When dairy cows were affected there was a loss on an average of $25. per head, including the sacrifice of all dairy products, but death was unheard of. No claim was ever made for the value of an animal that had died, nor was such a probability as death from this disease ever thought of. Though herds were infected in the fall by the contaminated animals purchased for feeding,or dairying, and, (unless additional purchases were made through the winter) their successors in the same stalls and boxes in the spring never contracted foot-and-mouth disease. Not one of the crop of spring calves in the dairies ever showed a sign of this malady.

The sad losses from *lung plague,* since the inauguration of free trade in cattle from the Continent of Europe, led to the formation of at least seven Live Stock Insurance Companies to reimburse their members when pestilence invaded their herds, but all got into financial difficulties in a few years and most of them suspended their operations. The striking feature of these societies is that none of them ever recorded the payment of an indemnity for an animal that died of foot-and-mouth disease. McMinn's Statistics for Scotland of the Agricultural Cattle Insurance Company, covering a period of six years (1855 to 1860) when aphthous fever was rampant, furnish 1474 deaths, but not one of these was from foot-and-mouth disease.

The reports published in the London Veterinarian for the time succeeding the importation of the disease, recorded the progressive extension over those parts of the nation invaded, at a time when stockmen were in a state of consternation, but it gave no records of deaths, in most marked contrast with the reports of lung plague, in which the list of fatal cases were the prominent feature. And this be it noted was during a period when there was no government slaughter of infected and diseased stock. Fatal cases in all diseases had full opportunity to manifest themselves, and had there been a manifest mortality, the terrorized stock owners would not have been slow to complain of it.

In the invasion of Canada and the seabord northeastern states of the United States of America, in 1870 the same tale was told. The infection came in a shipment of cattle from Great Britain, and landed at Pt. Lewis, across the river from Quebec. They had suffered from foot-and-mouth disease on the sea passage, but had apparently recovered when landed, and were sold to go into differ-

ent parts of Quebec and Ontario. The disease followed in the various thoroughbred herds into which these animals were taken, and near adjacent herds and the maritime provinces of Canada suffered an extended outbreak. But there was no greater mortality in Canada than there had been in the previous 31 years' prevalence in Great Britain, and then came the turn of New York.

The first center of infection was reported as at Oriskany, Oneida County, N. Y., in September, less than ten miles west of Utica where the State Fair was held during the same month. It was said to have been brought in by Canadian cattle, and whether in *Cattle* or by other *carriers*, it undoubtedly came through that channel. It followed its immemorial habit of extending along the lines of cattle traffic, until it had stretched its sway over nearly all of eastern New York, New England and New Jersey. I followed its course in my own state, and found each invaded herd universally sick, the flocks and pigs suffering wherever brought in contact with the sick stock, or the infected premises, and a sprinkling of other genera, including some human beings, showing characteristic lesions. Fortunately the cattle trade was mainly from west to east, the few thoroughbred cattle to be sent west being held for a length of time to avoid all risk of shipping contagion, the affected stock were soon in winter quarters, the dairy farmers were so disgusted with the affection that they did not attempt to break the voluntary quarantine, the passenger birds were soon all gone for the winter, it was happily before the days of the English sparrow and starlings in rural New York, and as stockmen were assured that there was no danger of losses by death, there was no temptation to dispose of forage which would all be needed as feed for the herd when recovered. Fortunately too, our farms were all fenced, and the pastures died down under the frost so that there was no risk of the mingling of herds on a common field. The guardians of the stock were strongly enjoined not to allow visitations by man nor beast from herd to herd, and that no products of the dairy should be sold until the stock had fully recovered. *No deaths occurred.* By the time the spring calves came, and the cows freshened, the infection had become nonvirulent, none of the young suffered, and the dairy products could safely be sent anywhere.

Those who were morbidly obsessed in favor of universal slaughter of infected herds have without shadow of reason announced that this invasion of America in 1870 was a mild form of the disease

and that it was on this account that it failed to extend and perpetuate itself in this country at that time. If this means anything, it means a lack of *virulence* on that occasion. But this means the absolute defiance of the notorious facts of the case. The malady imported had proved that it was of unusual virulence for a year or two just preceding its importation, that by virtue of this infectiousness it had defied all restraint and spread over the Continent in general, that it had made an equal extension, in defiance of all restrictive efforts, in the British Isles, that the shipment to Canada, composed of carefully protected, high class, thoroughbred cattle had found it impossible to reach the quarantine of the Atlantic steamer without bearing the infection in their midst, that although they passed through the disease on the ocean, they had so far recovered that they were received as sound animals when they left the ship, that though they were disembarked at Port Lewis in August, the infection carried by them had spread widely through both Quebec and Ontario and early in September it was already ravaging Oneida County, N. Y. This is not the history of a disease of minimum virulence.

But it did not stop here. It continued its triumphant career for months, spreading rapidly and widely in eastern New York, New England, and New Jersey, until it again reached the Atlantic Ocean without a craft to bear it back to England. They were badly off for argument who assumed that it was lack of potency that led to its complete suppression and disappearance at this point. It was rather its all but uncontrollable virulence which defied any and every limit to its extension and included in its successful domination every animal in every herd that it once entered, that brought the invasion to an end. No herd was affected in part only, every bovine, ovine, and porcine animal within reach succumbed with unfailing promptitude and certainty, the whole group passed through the disease at the same time, recovered simultaneously and became without exception immune. Had it been less virulent, had it taken one animal today and another next week, advancing in this leisurely way, there would have been a different tale to tell and a complete subsidence and disappearance of the pestilence would have been virtually impossible. It was the remarkable potency of the virus rather than its weakness that at that time saved the nation from a still wider, or an universal infection. It was the quarantine, voluntary as it was, and the equally voluntary disinfec-

tion of the infected premises and things that called a halt to the hitherto unconquerable assault of the pest.

It was further claimed that the severity of the winter frosts, bound up the virus until danger was past. But this argument is equally baseless, and equally fatuous. The invasion of New York took place in September when frosts are rarely seen and never continuous. Moreover, the whole history of this disease in its primary homes of Siberia, Russia and Northern Europe, has shown no such subserviency to frost. And in these lands, too, with ample supplies of roots for winter feeding, and where the hibernal solstice was the great period for putting up to fatten. Assuredly if frost could of itself stop the progress or existence of infection, the fact must have been long a household word in Northern Europe and Asia. But neither Europe nor Asia has given a hint of such an occurrence. It is true that extreme and rigorous cold which necessitates the shutting up of all animals indoors, has always contributed, and must always conduce, to the rapid progress of infection through a herd and to prevent the extension to other herds that are not in direct contact with the infected subjects but *it is the rigid seclusion and quarantine,* rather than the freezing up of the virus that must be charged with the result. The germ of the disease lives in the warm body of the animal and propagates there, and wherever animals can live together they always find it easy to communicate infection. Ice tends to preserve the disease germ and other ferments; it is the non-freezing weather that is most favorable to rapid loss of potency by air, light and electric conditions.

It would be easy to adduce further evidence that the uncomplicated foot-and-mouth disease is anything but a *fatal* malady, but the above ought to suffice. This may be a *fatal* excess of optimism before this audience, seeing that one short year ago a resolution designating this disease as *fatal* was proposed in this association and bade fair to be adopted, but for the timely correction by Dr. Torrance. We should bear in mind that a gross misstatement, repeated often enough and with sufficient force, is likely to be accepted by a majority who have had no means of putting its truth to the test. Yet for the minority who know how baseless the assertion is, nothing could more thoroughly undermine confidence in this association.

Causes of Prolonged Latency of the Germ. It would be wrong to entirely omit the cases that have been supposed to be

causes of prolonged incubation and by which the disease is sometimes propagated when the first victim has apparently recovered. Many such cases and their causes are obvious enough. Others may be traced to occult condition to which the mind of the practitioner is not alert, because they are never recorded in systematic treatises.

*Infected fodder or litter, closely packed,* so as to exclude air and light, retains infection much longer than when fully exposed. In free air these become non-virulent when exposed to a temperature of 88° F. till dry. They remained infecting for nine months when kept at a freezing temperature.

Again in the *non-vascular hoof* the virulence is sometimes retained for weeks or longer after apparently complete recovery. The invasion of America in 1870 was a case of this kind, the animals arriving at what appeared to be fine health and condition. The disease was at the time very prevalent in Great Britain from germs carried by cars, roads, or otherwise, and the cattle were probably infected on the way to the ship, if not even from the ship itself. Certain it was that the cattle passed through the affection while crossing the Atlantic, and their health appearing good on landing, they were sold without apprehension to go into different herds in the provinces of Quebec and Ontario. It became at once widely spread in the susceptible herds receiving them, and in others through sales. The imported cattle were landed at Point Levis opposite Quebec in August, and in September the disorder appeared at Oriskany, Oneida County, N. Y., less than ten miles from Utica where the State Fair was to be held the same month. From this point it quickly extended along the lines of the N. Y. Central, Harlem, and Boston and Albany railways into Eastern New York, Massachusetts, New England generally, and New Jersey.

From this time on until 1883, when federal quarantine was imposed on all imported cattle, infected cattle were imported at intervals and taken at once to their destinations inland, where the herds receiving them forthwith contracted the disease, as usual without an individual exception in a herd. Letters in live stock journals attest this and the different outbreaks supervening at once on the arrival of the infected cattle, and the facts that no member of an invaded herd escaped, that all suffered from the same characteristic symptoms, familiar to the reporters from a long personal experience with the disease in Europe, that all recovered in about 15 days, make it virtually impossible that there could have been

any mistake in the malady. These herds were all valuable, thoroughbred animals, and their owners well acquainted with the nature of the trouble, and conscious that the disposal of these animals at once would destroy their business, refused to sell or deliver any for a period of three months, and until after disinfection, and in each case the infection was confined to the herd as in the Scottish feeding farms already referred to. In the nature of things each such invasion must in its initiation have presented an exact counterpart of the great invasion of 1870. They doubtless contracted the disease on their way to the ship, passed through it on the ocean, seemed well on arrival, and were taken to their destinations, only to infect other stock from their seemingly healthy feet, teats, mouths, etc.

One other case of this kind occurred shortly after the federal quarantine was established at Portland, Me. The appropriation was not adequate to provide sites at the docks or even on an island where animals could be disembarked and quarantined. From Jersey City the cattle had to be carried in closed railroad cars to Garfield, and at Portland they had to travel, a mile or more, over the highway to the quarantine station. In 1884 a shipment from England arrived at Portland in apparently good health, but two days later complaint was made that two work steers that had followed them over the same path were ill with foot-and-mouth disease. The imported stock had been examined on landing, by Dr. E. F. Thayer, of Massachusetts, who found nothing amiss, and had there been any tenderness, lameness, or any remaining lesions on the feet, teats or mouth, it could scarcely have escaped detection, for Dr. Thayer was a very accomplished and observant man. He had studied in medical schools, and had spent some time in British veterinary colleges to good purpose. He had had long experience, and his value was generally recognized. He had served two years as president of this association (1869 to 1871). He had served his state nobly in *stamping out* its then prevalent lung plague, and he was now, with myself, a professional member of the U. S. Treasury Cattle Commission. Here again then we had convalescent animals, with no remaining visible sign of disease, which notwithstanding this left on the public highway enough virus to contaminate cattle that passed over the road later. Both lots of cattle were carefully isolated, both recovered, did well, and neither con-

veyed any further infection to other stock, though after leaving quarantine they mingled constantly with susceptible animals.

Beside the *nonvascular hoof of cattle, sheep, goats* and *swine*, we must consider also the *horny claws of birds, dogs, and cats*, the *hoofs of horses*, and even the *bills of birds*, all of which may imbibe the virus from *liquid infesting material* (*wet manure, urine, milk, contents of vesicles, blood*, etc.) when they scrape, scratch or peck among such matter.

Still more likely to hold and unduly preserve the potent virus are *hoofs injured by the rasp, by mechanical injuries*, those *detached by suppuration beneath them, which separates the horn from the subcorneous tissue*, and finally when the *new and spongy horny growth* stands out from the vascular tissue beneath.

Also the *breaches and distortions* caused by the *coincident* occurrence of foot-rot, and the development of *a ragged and irregular growth of horn*.

*Gangrenous ergotism* with *separation of the horn from the quick, shedding of the horn*, and *necrosis of even the bones and tendons, up to the coronet, the fetlock and sometimes the hock*, makes an admirable bed for the virus and a means of prolonging its poteney.

The *bacillus necroseos* (*necrobacillosis*) may attack any part of the body, but is especially liable to be located about the mouth in young sucking animals, and on the feet so that it may be mistaken for *foot-and-mouth disease*. Wherever planted it leads to extending death of the tissues so as to furnish an appropriate culture-field for preserving and multiplying the infection; it forms therefore one of the worst complications of *aphthous fever*.

I should add to this *all skin diseases with cuticular thickenings and desquamations, hypertrophied epithelium or parts exposed to constant friction, desquamation, epidermic pads, and scabs, brisket disease, erythema, vesicular eruptions in skin or mouth, pemphigus, ecthyma, impetigo, acne, porrigo, erysipelatoid eruptions, blacknose in sheep, harness sores, floor bruises and sores, irritation from fecal secretions, soaking with urine, alkaline, acid or saline caustics, mycotic, bacterial or other infection and growths, ringworm, fusariasis, rusts* (*uredo*), *puccinia, mould*, (*mucor*) *fungus, saccharomyses, diphtheria in calves, croupous formations in mouth, throat, bowels and air passages, abscesses of all kinds, dermoid cysts, calcified dermis or cuticle, solid concretions and calculi in*

*bowels, liver, gallducts or bladder, pancreatic gland or ducts, pultaceous accumulations in tonsillar or Peyer's follicles* and above all *in the sheath of the castrated male bovine.*

*In the streptococcic infection of the connective tissue, joints and tendons of the digital, metatarsal* and *metacarpal regions,* the virus may find a place of concealment and preservation, if not also multiplication, in encysted pus, as well as in necrotic and semi-detached tissue.

In the *udder,* the *teats* are especially liable to become foci of infection and no less the *glandular and connective tissue of the mammae.* On the former the vesicles, broken in milking, are followed by scabs in which the virulent matter is enclosed and dried up; in the gland pus sacs form and in the milk sinuses and gland tissues are often purulent collections, holding and even cultivating the morbid germ. All of these are separated to a greater or less extent from the circulating blood and are thus saved from the antimicrobian and antitoxic action which retards microbian growth and destroys germs.

In the mouth various disease-products tend to envelope and preserve the germ. Thus the following act more or less in this way: *actinomycosis, cancer, epithelioma, bone softening in young and old, fractured jaw, loosened teeth, suppuration around the tooth fangs, pus pockets on the root or in the papilla, dentinal tumors, suppuration in the tonsils, in the pharyngeal or laryngeal walls, in the soft palate,* or *sinuses, decayed and hollow teeth, superfluous teeth, over-grown teeth, sharp edge on teeth with open wounds of the cheek, injuries from use of gag, probang, or looped wire,* etc. The rule holds here, as elsewhere, that where we meet with absorbent, nonvascular tissues, and especially when, as in the mouth, they have been freely exposed to an extremely minute, filterable virus, such virus may be held to be protected for a longer time against devitalization or destruction.

The same consideration would apply to the *sarcocystis* (*Guischer's* or *Rainey's* tubes) a zoophyte found in the muscles of nearly all genera of animals, encysted in the fibre and at a more advanced stage in the connective tissue. These created a great furor in Great Britain in 1865 in connection with the prevalent rinderpest, but its wide distribution among animals, discovered later, showed that its presence had no direct connection with that disease. The experiments of Theobald Smith and Darling in suc-

cessfully transmitting the infestment from mouse to mouse, by feeding, implies a possibility of it acting as a "bearer" in *foot-and-mouth* and other similar affections.

In the same connection must be named the familiar *Trichina* which like the sarcocyst often abounds in the lingual muscles and is capable like it of absorbing and *"carrying"* the infra-microscopic germ. They will become even less resistant to the germ when they perish in the tissues and remain as dead material.

The same remark applies to the *Linguatula taenioides*, which has been found in the nasal sinuses of sheep and goat, and to the much more familiar *larva of the gadfly* (*Estrus ovis*) which hibernates in the same cavity.

*Leeches* attached to the *fauces or pharynx* should be named here as possible *"bearers"*. Also those forms of *chronic catarrh* in cattle turned out on brushy pastures and which fill up the nasal chambers with broken twigs from the bushes, abundantly capable of absorbing, preserving and *"carrying"* the *virus*. *Thorns* and *thistles* imbedded in the lips or buccal mucosa must also be placed in the same list of possible absorbents and preservatives.

Not the least of these dangerous retainers of infection are the *degenerated tubercles*, not only those in the glands of the throat, but in a lesser degree, wherever they are within reach of the infection circulating in the blood and tissues.

If we follow along the alimentary canal, we are confronted with the *larvae of the Estrus bovis*, which in their younger stages live in the coats of the gullet or in its vicinity, where, as in their later habitat under the skin, they sometimes perish and leave dead matter beyond the circulation of their host and capable of preserving the virus for a time.

The whole *alimentary tract and its contents* become of necessity charged with the infection, and may indeed become one great series of culture flasks and media for its development. This is especially true of those cases in which the infection, taken in with the food, expends its force on the fourth stomach and intestines, and proves so fatal to its victim.

As a corollary of this the bowel dejections, wherever carried are infecting, and when *dried up on the hips, thighs, udder*, and elsewhere, may be *"carried"* far and transmitted widely.

I am afraid I have wearied you with this recital, but inasmuch as I began by emphasizing the fact that *foot-and-mouth disease* in

its uncomplicated form, is remarkably free from danger and mortality, it is necessary to boldly face the other aspect of the case, and give attention to the many conditions that may complicate a certain individual case and tend to even lethal results.

I must therefore add that there remain, to be considered, a large number of parasites which may become a means of carrying infection, of holding it in a virulent condition, of extending the period of potency, and thus of maintaining an outbreak. There are the tapeworms, which, in their cystic form, embedded in the tissues are always to be looked upon askance as fields of infection, the biting and blood-sucking parasite as opening a direct channel for both microbe and toxins into the tissues and circulation, without passing through any corrective action by the protective layer of epithelium cells, and the wandering embryos and adults in carrying germs into blood and tissues direct. Thus in dealing with each particular genus and age of animal, a full knowledge of each habitual parasite of that genus is essential in order that special precautions may be taken to cut short its existence even if that must be done by the sacrifice of its host.

*(To be continued)*

## KERATITIS INFECTIOSA IN CATTLE (KERATITIS PYOBACILLOSA)[1]

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****[2]Schimmel states that rays of sunlight may play an important rôle in keratitis for the disease exists in the summer months, especially when the weather is dry and hot. Cattle that were in the shade of an orchard were exempt from the disease, notwithstanding the fact that they were milked by the same people who milked the other cows of the owner, which were infected with this eye disease. Schimmel observes that, it is very possible that the disease is originated by sunlight and maintained by infection. If

1. Tijdschrift voor Veeartsenijkunde, Vol. 38, 1911, p. 758.
2. References made to the opinions expressed by some earlier writers and not directly related to the work of Dr. Poels, have been omitted by the translators.

the sun can produce a solar eczema on the white spots of cattle, then one may also attribute to it the power to excite a keratitis.

This communication of Schimmel attracted my attention because one can hardly deny a predisposing agent to the pathogenesis of this eye inflammation, which in fact is caused by a microorganism.

Kattenwinkle describes a light form in which the cornea is only partly clouded and in which recovery occurs in 8 to 14 days without leaving a blemish. He describes a more severe form in which an infiltration occurs in the parenchyma of the cornea under the epithelium. This occurs in such amount that the central part of the cornea becomes yellow and spotted, bulging out conically so that it appears as if the yellow or yellowish gray infiltration were located on the cornea.

I make particular note of these communications because they throw a true light upon the correct observations of Kattenwinkel who has also observed with great accuracy the marked development of blood vessels on the periphery of the cornea.

The slight and severe forms are characteristic of this disease, besides, the process is always located entirely in the central part of the cornea and is at the beginning subepithelial.

The process develops in the central part of the cornea nearly opposite the pupil. Schimmel observed abscess formation and ulceration of the cornea only exceptionally and in the later stages of the disease. It appears that abscess formation is rare but I have observed an ulcer in the cornea.

In the beginning of the disease the infected eye shows marked lachrymation, photophobia and gumming of the eyelashes, especially of those of the upper lid. The path of the tears in a downward direction over the face is indicated by the gumming of the hairs. Besides, the whole eye is hot, painful and swollen. When the disease is discovered, conjunctivitis already exists, which may suggest that conjunctivitis is the primary lesion. This, however, is incorrect because the cornea is affected first and the conjunctivitis should be regarded as a subsequent development. A diffuse infiltration which is originally milky white, exists in the middle of the cornea. The diffuse corneal infiltration remains white in cases where the process rapidly subsides. In more severe cases, a more or less yellow color soon appears and the process is principally subepithelial. It soon spreads over the entire thickness of the cornea

thus developing a true keratitis parenchymatosa. In many cases adhesion of the cornea and iris occurs and in this case the fluid in the anterior chamber of the eye is practically all extruded and makes place for a mass of yellowish white, somewhat thick tissue. Casually observed, one gains the impression that it is pus, however, when incised, one finds instead of pus, a fairly solid tissue. In many cases the process remains limited to the central part of the cornea. In other cases it spreads over the entire cornea. In that case the animal is completely blind in the affected eye. Although I did not have occasion to determine if iridochoroiditis occurred in such severe cases it is very possible that this will be found to exist especially when suppuration occurs. However, I believe that too much importance is attached to suppuration in this keratitis, because in cases where I suspected the existence of hypopyon, as a matter of fact I found nothing else than solid tissue which occupied the cornea and the anterior chamber of the eye. In cases which I investigated, the involvment of the cornea was always most prominent so that I am convinced that in many cases the disease process remains limited to the cornea.

One case which I investigated showed an ulcer the size of a dime in the center of the cornea, which ulcer apparently occurred because the necrotic portion of the cornea at this point had disappeared. It may happen that the cornea becomes perforated in this manner and that a prolapsus of the iris occurs with adhesion of the iris to the diseased tissue of the cornea.

It is characteristic that in severe cases a marked formation of new blood vessels occurs at the periphery of the cornea beginning at the upper portion immediately adjoining the sclerotic coat. However, it also often happens in the course of the disease that the entire cornea is encircled peripherally with an intensely red colored fringe, which may reach 2 to 3 mm. in width. Often the cornea becomes somewhat conical shaped in the central part. This conical part is generally very rich in blood vessels on the surface and protrudes like a teat above the surface of the cornea so that it may be removed by an operation. Occasionally a staphyloma corneae is observed in the course of the disease, and in rare cases a shapeless mass of tissue (Caro luxurians) occurs. Generally one eye is affected but occasionally both.

Bacteriological Investigation. Immediately after I noticed the existence of this disease I made effort to ascertain its cause.

From the nature of the disease it appeared that it was improbable that the virus could be sought in the fluid which existed as a result of the hypersecretion of the eyelids, and which was found on the conjunctiva and medial canthus. Cultures made therefrom are absolutely worthless from an etiological standpoint. Therefore, the part of the cornea where the process occurred was incised and the infected tissue collected for bacteriological investigation with a sharp curet.

Five cattle which were affected in various degrees were operated upon and the diseased portion of the cornea was removed. The difficulty in this operation occurs in that the animal constantly turns the eyeball in the direction of the medial canthus with force so that it is completely hidden under the third eyelid. Therefore the eye was anesthetized by cocaine and a thread was inserted in the third eyelid in order to pull it outwards. Next, the cornea was split above the infected spot with a very sharp pointed scalpel. The diseased part, taken between tweezers, was clipped off with sharp scissors wholly or in part.

This operation does not hinder healing and I am of the opinion that the operation of removing the haw could justifiably be applied here in practice.

When one makes a bacteriological examination of the material thus obtained and uses the Gram stain, counter-stained with eosin, one obtains astonishing results. In preparations made in this way there are found myriads of small bacilli, which have all the characteristics of *B. pyogenes* which as is known is also the cause of udder pyobacillosis.

Besides, there were present two species of micrococci, one of which takes the Gram stain and the other does not. On the ground of the known pathogenicity of *B. pyogenes* I concluded that this microorganism is the specific cause and I considered the two species of micrococci as secondary infections.

However, the Gram-positive coccus occurred too constantly and in too great numbers to deny it all pathogenic qualities.

Because it is known that many microorganisms with very specific pathogenicity only grow on media in which there is present fluid blood serum of the same species in which the specific disease occurs, inoculations were made on cattle serum agar and on cattle blood agar exclusively. The diseased tissue of the cornea was smeared on this medium and placed in the incubator at 37°C.

After 36 to 48 hours incubation the cultures yielded important results. The coccus which already had been demonstrated microscopically had formed many and relatively large colonies and between these large colonies an enormous number of exceedingly small colonies had developed which in the beginning could only be seen with the hand lens. Upon investigation it appeared that the small colonies were those of *B. pyogenes.*

These small colonies not only develop in between the coccus colonies but also grow on and even in these, so that a symbiosis between these microorganisms could be observed in the culture.

There exists, therefore, in these microorganisms a symbiosis in the cornea *in vivo* and a symbiosis *in vitro.* The question arises: which of the two is the pathogenic agent? Therefore, *B. pyogenes* thus isolated was inoculated into an eye as was also the coccus. It was observed that the eyes that were inoculated with *B. pyogenes* demonstrated the typical picture of keratitis infectiosa, within a few days, while the eyes inoculated with the coccus showed practically no reaction.

The cattle which were inoculated with *B. pyogenes* demonstrated also in the further course of the disease the entire picture of the original keratitis infectiosa and even developed characteristically the red colored fringe of the periphery of the cornea.

It thus became evident that this cattle disease is caused by *B. pyogenes* which microorganism on account of its pathogenicity for cattle in general has attracted the attention of the veterinary profession in late years.

I wish to add that the infection of the cornea should be induced in a very peculiar manner. After the eye has been rendered insensible by cocaine a very small quantity of culture is injected underneath the epithelial layer of the cornea with an exceedingly fine and sharp hypodermic needle. Immediately after injection one may observe how far the liquid has dispersed in the epithelial layer by the grayish white spot resulting, because it has a different refractive power than the cornea. The point of the needle which is being used for this injection should previously be examined with a lens in order to ascertain that it is not bent back to the least degree.

The needle is inserted under the epithelial layer so that the oblique opening is entirely covered by epithelium because otherwise the liquid is deposited on the outside surface of the cornea and

I have not been able to produce the disease experimentally by putting drops of pyogenes cultures on the cornea.

Furthermore, I have injected cultures of pyogenes bacilli under the epithelial layer of the cornea of a sheep, and a horse, but practically no reaction occurred in these animals.

Finally, I inoculated a calf with a culture of *B. pyogenes* in the manner indicated. The culture in question originated from a case of udder pyobacillosis. This inoculation gave a positive result, thus demonstrating that *B. pyogenes* should be regarded as the cause of the infectious eye disease of cattle now existing in Holland. I do not wish to give any further details regarding the cocci that I found because I am still extensively engaged in studying these organisms to determine what importance they have as secondary invaders in this disease. That they are secondary invaders should be concluded because they are also present in the experimentally produced keratitis which resulted through injection of a pure culture of pyogenes bacilli.

I wish to add that these cocci do not grow at low temperatures but when cultures are kept at 22–24°C. the gelatin liquefies so slowly that I was originally of the opinion that the micrococci do not have the power of liquefying this culture medium.

Contagion by contact exclusive of predisposing influences apparently does not exits in keratitis. In slight cases which soon recover one can plainly demonstrate *B. pyogenes* microscopically. However, the organisms fail to grow because they have died through bacteriolysis. In these cases one is able to demonstrate the presence of the coccus not only microscopically but also culturally, for its powers of resistance do not seem to be slight.

I have used pyogenes serum as a prophylactic and as a curative agent with favorable results.

***1. The translators here omit a discussion by Dr. Poels regarding possible factors predisposing to the occurrence of Keratitis. He notes that keratitis infectiosa occurs in goats along with contagious agalactia and observes that some of the cattle affected with keratitis, have been affected with foot-and-mouth disease some time before. However, he doubts the importance of this last mentioned disease as a predisposing factor.

—Dr. O. W. Anderson has removed from Chicago, Ill., to Creighton, Neb.

—Dr. J. R. Severin, formerly stationed at Sioux City, Ia., is now with the Fort Dodge Serum Co., Fort Dodge, Ia.

# TUBERCULIN TESTING*

DR. A. T. KINSLEY, Kansas City, Mo.

It was with reluctance that the writer accepted an invitation from the officials of this organization to prepare a paper on this subject, but after due consideration it appeared that, however old the subject of "tuberculin testing" may be, it is evident that application of the methods of control of tuberculosis is not producing the desired results, therefore a discussion of this topic may be appropriate. The writer will not attempt to consider all phases of tuberculin testing in detail because of the magnitude of the subject.

Tuberculin testing is the determination of the presence or absence of tuberculosis in animals by the application of tuberculin, and the following remarks will be confined to the tuberculin testing of cattle. Tuberculin, of which there are many varieties, is a biologic product containing disintegrated *B. tuberculosis* in their products. The methods of preparation of tuberculin are given in various text books and the dosage is indicated in the literature or upon the labels of tuberculin containers, therefore these problems will not be given any further consideration in this discussion.

In the study of infectious diseases it has been found that in different diseases special phenomena are manifested, as illustrating immunity or increased susceptibility. It is common knowledge that a hog that has passed through an attack of hog cholera is immune to that disease, and it is also common knowledge that an animal may be affected with tuberculosis for the greater portion of its life and as it advances in age become more susceptible to that disease. The scientific explanation of the persistent and increased susceptibility of the tissues of an animal to one type of infection and their resistance to other infections has not been determined.

A tubercular reaction is an indication of an increased susceptibility of the tissue of the reacting animal to the disintegrated bodies and products of the *B. tuberculosis.* This is an allergic reaction, and is the condition commonly known as serum sickness or anaphylaxis. A true tuberculin reaction, is specific and is indicative of tuberculosis in the reacting animal, although exceptions may occur.

*Presented at the Annual Meeting of the Oklahoma State Veterinary Medical Association, May 3rd and 4th, 1917.

The response of a tubercular animal to tuberculin is three fold, consisting of a local, a focal and a general or systemic reaction. The local reaction occurs at the point of injection of the tuberculin and is the reaction evidenced in intradermal and ophthalmic tuberculin testing and is manifested by local hyperemia and inflammation. The focal reaction consists of a hyperemia with increased tissue action and occurs immediately around the tubercular centers, and may be responsible for the systemic disturbances which occur in the thermal or subcutaneous tuberculin test.

Three principal methods of applying tuberculin are available, viz: subcutaneous injection, topical application to the conjunctival mucous membrane and the injection into the skin. Upon this basis there are three types of tuberculin testing usually designated, as; first, subcutaneous or thermic; second, ophthalmic or ocular; and third, intradermic. Each of these will be briefly discussed.

The subcutaneous or thermic tuberculin test is the original method that was the outgrowth of Koch's attempt to treat tubercular patients by the injection of tuberculin. This test is made by obtaining three or more temperatures, of the animals to be tested, prior to the injection of tuberculin, and five or more temperatures after the injection of tuberculin. The pre-injection temperature should be obtained at about 2, 5 and 9 p. m., the tuberculin injected immediately after taking the 9 p. m. temperature, and the postinjection temperature should be taken at 6, 8, 10 a. m., 12 m. and 2 p. m. It is probable that more accurate results will be obtained if the length of time between the injection of tuberculin and the first postinjection temperature did not exceed six hours, and the temperatures taken every two hours until 18 hours after the injections of tuberculin. A reaction in the subcutaneous test consists of a systemic disturbance manifested by a rise of temperature in which the thermic variation makes a double curve. It is therefore apparent that it is essential to determine the normal temperatures of animals previous to the injection of the diagnostic dose of tuberculin and this is the reason for obtaining the preinjection temperatures. It is also equally essential to guard against conditions and environments that will tend to cause variations in the preinjection as well as in the postinjection temperatures.

This method of tuberculin testing is reliable if conditions

and environments causing variation in the temperature of the animals tested can be controlled, otherwise the findings will be inconstant. This test, if correctly and honestly applied, is adapted to those cattle that are accustomed to being confined, but is not adapted to the testing of range cattle or those that are not accustomed to confinement.

The ophthalmic or ocular tuberculin test consists of the application of a small quantity of purified tuberculin upon the conjunctival mucous membrane of one eye. An ophthalmic reaction consists of congestion and inflammation of the conjunctival mucous membrane. The congestion is usually evident within 12 hours after the application of tuberculin, and this is succeeded by an inflammation characterized by a muco-purulent or purulent exudate, which is sometimes so profuse that it will be observed as a discharge upon the skin beneath the inner canthus. This reaction is usually most intense about eighteen hours after the application of the tuberculin and persists for several hours thereafter. This test has not proven as accurate as the subcutaneous test. The ophthalmic test should not be applied when there is any disturbance of the ocular mucous membrane or upon animals in a pen or barn where dust is likely to be introduced into the eye.

The intradermal tuberculin test consists of the injection of a small quantity of tuberculin into the dermis. The usual site of injection selected is the caudal fold because of the pliability of the skin and easy access to this particular region. However, some investigators have made the injection in the skin of the lower eye lid and are claiming splendid results. An intradermic reaction is manifested by a local disturbance, resulting from the irritation of the sensitized tissues, and consists of a tumefaction of the cutaneous structures and special involvment of the related cutaneous lymphatics. The reaction becomes evident, in from 12 to 72 hours after injection, by a swelling varying in size from a large pea to a mass the size of a hen's egg. On close observation this swelling is found to be doughy, sometimes quite sensitive, and surrounding the line of introduction of the needle there will be a bluish area, this latter being particularly visible in white skinned animals. The swelling will persist for from five to fifteen days after injection and will then gradually subside. Sloughing frequently occurs, particularly of the area around the site of injection. An atypical reaction consists of a leathery thickening

of the caudal fold without any noticeable enlargement of any particular point. The magnitude of the reaction is probably an indication of the extent of the lesions. The small swelling appears to signify extensive infection and the large swelling small and probably recent infections, but thus far the exact relationship has not been positively established. As will readily be recognized, the intradermal tuberculin test has fewer objectionable features so far as the control of conditions are concerned than either the ophthalmic or thermic tests. It is equally applicable to range, dairy or show cattle; in the hot summer months and the cold winter months; in cows that have recently calved or are in the advanced stages of pregnancy; or during the oestral period.

The intradermal tuberculin test has received very careful consideration and study by Dr. D. F. Luckey, of Missouri, since 1908, during which time various phases of the technique of the test have been elucidated and perfected. Other states have done considerable experimenting with the intradermal tuberculin test, viz: California, Kansas, Texas, Oklahoma, Nebraska, South Dakota, Montana, Wyoming and Iowa, and some states are now accepting this test for interstate shipments. The accuracy of this test is largely dependent upon the correct technique of injection and interpretation of the reactions. The test from the scientific view point is much more accurate than the subcutaneous test, as the reaction of the intradermal method is local, whereas the reaction of the cutaneous is general or systemic.

Some maintain that the ophthalmic test is more reliable than either the thermic or intradermic. Those who have used the intradermal test intelligently and conscientiously, maintain that it has many advantages over both the thermic and ophthalmic tests.

Combinations of two of the methods of testing may, under certain circumstances, be of advantage. Dr. Luckey has reported that in tubercular herds he has obtained very satisfactory results by applying the ophthalmic tuberculin and giving the thermic test four days later. By this method the ophthalmic reaction is revived and intensified and in some instances tubercular animals react that do not respond to either test given separately. It is the judgment of the writer that all of the tests are of value and are quite reliable when properly applied under circumstances that favor best results for the test in question, and that condemnation

of one or the other test by certain officials is absurd and is evidence of a lack of a proper understanding of the subject in question.

The question of retesting frequently arises and unless great care is exercised, retesting causes much grief. It is the judgment of most men that a retest of typical reactors should not be given whether the test has been thermic, ophthalmic or intradermic. If a retest is permitted it should not be done for a period of sixty days or more after the primary test and most authorities agree that a retest should not be made in less than ninety days.

Considerable controversy has arisen as to the efficiency of the various tests and one writer, a member in a well known sanitary organization, stated last December that "The subcutaneous method has evidently been considered as the most accurate and has usually been accepted as the official test, the others being so far used for experiments only".

Tuberculin testing should be done carefully and with proper consideration of all factors that would in any way influence the outcome of the test in order that the findings may be dependable. Many test charts made by veterinarians are indicative of carelessness and in some instances bear evidence of dishonesty. It should be distinctly understood that tuberculin testing cannot be successfully done by one who has not carefully studied every phase of testing.

In the annual report of the state veterinarian of Montana, it is shown that over ten percent of reactors were obtained in retests of some thirteen hundred cattle which had been brought into that state. Such findings are evidence of gross negligence or incompetency on the part of the individuals who have made the tests required for admission to the state. From the sanitarian's view point, tuberculin testing should be the most sacred duty of the veterinarian and those who have made improper charts or have been dishonest in their methods, should be prohibited from doing further testing, and it would not be too severe a punishment to revoke their licenses. Every test, regardless of the individual for whom such test is made, should be carried out in every detail. Unless radical changes are made in the testing done by the general practitioner, it seems probable that the future tuberculin testing will all be done under the direct supervision of government and state officials.

The primary object of tuberculin testings is to identify tubercular animals and is therefore a diagnostic method of solving the problem of control and ultimate eradication of tuberculosis in cattle, which, when accomplished, will simultaneously result in the eradication of swine tuberculosis and tend to diminish human tuberculosis.

## SUMMARY OF OBSERVATIONS ON 1470 HOGS, HYPERIMMUNE TO HOG CHOLERA*

H. C. H. KERNKAMP,
University of Minnesota, University Farm, St. Paul, Minn.

The data and observations alluded to in this paper were made upon a large number of pigs used for the production of anti-hog cholera serum (Dorset-McBride-Niles method) at the Minnesota State Serum Plant. They cover a period of approximately thirty-seven months, from December 1913 to December 1916, inclusive. Since the production of anti-hog cholera serum must necessarily follow the production of hog cholera virus, the author thought it advisable to report these findings as a sequel to those presented by his predecessor.[1]

In nearly all instances, pigs used for the production of serum were obtained from the stockyards at South St. Paul. They weighed on an average 87 pounds per head when purchased. They were received at the plant, carefully weighed, tagged, and described, and then immunized against cholera by the serum-virus method (simultaneous vaccination). After keeping them in quarantine pens for at least twenty-one days, during which time they were watched and the results of vaccination recorded, they were transferred to a feeding farm and kept until they were more fully grown. By this method of procedure a rather complete history of each animal was known, when it was presented for hyperimmunization. These principles were deviated from in only a few instances and then the animals were personally selected when procured.

*Published with the approval of the Director, as paper No. 64, Journal Series of the Minnesota Agricultural Experiment Station.

1 HOSKINS. Observations on 2800 pigs Inoculated with Hog Cholera Virus. *Jour. A. V. M. A.*, September 1916.

The actual number of animals operated on was 1470, but the statistical figures mentioned cover the number of times they were used during the operations.

The average weight per hog at the time of hyperimmunization was 267.14 pounds, although there was a total of 218 or 14.83% of the pigs that weighed 150 pounds and less, the lightest pig used for hypering weighing 113 pounds. It was not the intention to use such small animals as a regular procedure, but it often became necessary to inject one of proper size to utilize the remainder of a quantity of virus.

For the hyperimmunization of these hogs there were required 2,218,700 mils of virus (defibrinated virulent blood from pigs sick with hog cholera), an average of 1509.32 mils administered per hog, or an average of 6.18 mils administered per pound body weight. During the first half of the period covered by this report, two methods of preparing hyperimmunes were used; which were designated as the "slow intravenous" and the "intravenous" methods respectively. In the "slow intravenous" method there was an interval of from four to eight days between the first and second injection of the necessary dose of virus to affect a condition of hyperimmunity. This method was practiced on hogs that weighed 270 pounds and over, and required four to five mils of virus per pound body weight at each injection. The "intravenous" method is much more satisfactory, because the injection of the necessary dose of virus is done at one operation, the virus being injected into the posterior auricular vein under a pressure of from three to six pounds per square inch, and the amount of virus used is much less than with the other method. This latter method has been used exclusively for the past two years and often times a hog which had been hypered by the slow intravenous method at the initial hypering would be hypered by the intravenous method on subsequent rehyperings. By the initial hypering is meant that time when the animal receives its first large dose of virulent material intended to stimulate the production of an excess of immune substances.

One hundred and twenty-nine hogs were hypered by the slow intravenous method at their initial hypering, and only eight injected by this method at the time of their first rehypering, and two at the second rehypering, as compared to 1331 hyperings by the intravenous method.

During the first half of this period it was the regular proced-

ure at this plant to rehyperimmunize all hogs whose tails were long enough to permit of another one, two, or as many more tail bleedings as could possibly be obtained. 23.99% of the hogs were hyperimmunized once after a first series of three tail bleedings, and 8.63% rehypered again after another series of tail bleedings. It is of interest to note here that one individual of the latter group, a hog of 242 pounds, produced 14,372 mils of serum (defibrinated whole blood).

In the process of serum production, the length of time that should elapse between the time of hyperimmunization and the first operation to obtain blood (serum) whether it be by tail bleeding or carotid bleeding (killing), has been an open question among some producers of anti-hog cholera serum. At the State Serum Plant, sufficient time has always been allowed for the production of immune substances in the hyperimmunes, 13.06 days being the average length of time between these two phases of the process. The lapse of time between the first and second tail bleedings averages 7.25 days, 11 days between the second and third tail bleedings and 8.76 days between the time of the last tail bleeding and the carotid or final bleeding (killing).

There were 1587 first tail bleedings, at an average weight per individual of 209.85 pounds, and these produced an average of 1026.06 mils of serum per individual, or an average of 4.88 mils per pound body weight. From a total of 1466 hogs weighing 201.56 pounds per hog, at second tail bleeding, there were obtained 1120.76 mils per individual, an average of 5.36 mils per pound body weight. The total number of third tail bleedings is comparatively small, there being only 429, which weighed an average of 201.35 pounds per animal, bleeding 1045.94 mils each or an average of 5.18 mils per pound body weight. There was a total of 1292 hogs killed or carotid bled, which equals 87.89% of the total number hyperimmunized. These averaged per head 209.34 pounds and obtained 2460.46 mils per individual or an average of 11.75 mils of serum per pound body weight.

As a grand total number of mils of serum produced from these 1470 hogs that were hyperimmunized, we have 6,499,011 mils which makes an average per hog of 4421.09 mils.

During the period referred to there were occasional mishaps among the hogs at various stages of the process, a total of 126 being lost by death, 54.76% of which died between the time of hy-

pering and tail bleeding. A number of them died during or soon after hyperimmunization. These would usually begin their struggle before 300 mils of blood had been injected. The first indication that was apparent was the rolling of the eye-ball and rapid successive smacking or chopping of the lips, followed by the animal stiffening and relaxing with the intervals between these phenomena decreasing and then increasing again.

This phenomenon, shock, varied in its degree of intensity. In some cases it was so severe from the onset, that death resulted while the animal was still in the restraining crate; while others, after great effort to arouse them, would rise to their feet and in a weakened condition would stagger, topple over again, and often regurgitate. Some animals would live for from a few hours to twenty-four or more, without regaining vigor or consciousness apparently. The writer has checked many of these serious consequences by shutting off the influx of blood immediately at the beginning of the struggles by the patient, then carefully allowing only a small amount of blood to pass into the vein at intervals, until the animal showed signs of normal breathing and is sensitive to corneal irritation, whereupon pressure could be increased and the injection be continued as before.

Deaths not caused by the operation were attributed to such conditions as; air embolism, heat stroke, paralysis, fractures, pyemia, septicemia, cachexia, and other diseases of the respiratory, digestive, and circulatory systems.

The writer is indebted to Drs. H. P. Hoskins and J. T. E. Dinwoodie with whom he has been associated during the greater part of the time covered by this report, for their part in the recording of observations and statistics; and to Mr. R. E. Harlan, who assisted in the mortuary and operating laboratories.

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—Dr. Mason, who has been in charge of the veterinary portion of the Remount Depot at El Paso, Texas, has been ordered to the Remount Depot at Fort Reno, Okla. It is rumored that Dr. Grutzman is to be Dr. Mason's successor at El Paso.

—A newspaper statement that twenty-six deaths in two days from anthrax at Honolulu brought a report from Territorial Veterinarian Norgaard that the herd undoubtedly had been inoculated deliberately.

# THE LIFE HISTORY OF HYPODERMA BOVIS AND H. LINEATUM*

SEYMOUR HADWEN, D.V.Sc., Agassiz, B. C.

The notes which follow are based on observations made at Agassiz, British Columbia. The most important gap which remains to be filled in the life history of these two flies, is to discover the larva soon after it has bored through the skin and to trace its path to the gullet. Further observations are also required to sharply separate its various stages; unfortunately the species overlap. A number of the experiments relating to the migration of the larvae from the gullet to the back, and on the anaphylactic reactions which were made in collaboration with E. A. Bruce. It is not my intention to review all the work which has been done, except to mention the pioneer work of Bracy Clark, and of the later experiments like Brauer, Hiurichsen, Koorevaar, Curtice, Schaupp, (quoted by Riley) Carpenter, Hewitt and Glaser. It is pleasing to note that, headed by Bracy Clark, most of these men were veterinary surgeons.

THE PRINCIPAL DIFFERENCES BETWEEN THE TWO FLIES:

| *Hypoderma bovis* | *Hypoderma lineatum* |
|---|---|
| 1. Length 14 mm. Distance between eyes just in front of ocelli 1.9 mm., greatest diameter of eye 1.9 mm. | Length 12.7 mm. Distance between eyes just in front of ocelli 1.9 mm. greatest diameter of eye 1.6 mm. |
| 2. Yellow hair on anterior part of thorax. | Anterior part of thorax black and shining. |
| 3. Wing veins dark brown. | Wing veins nearly black. |
| 4. Alulae have a reddish brown border. | Alulae are uniformly white. |
| 5. Under part of abdomen and thorax nearly black. | Under part of abdomen and thorax lighter. |
| 6. Legs clean with few hairs. | Legs rough and hairy. |
| 7. Coloring of tail end orange yellow. | Coloring of tail end reddish orange. |

METHODS OF OVIPOSITION.

| | |
|---|---|
| 1. Lays in sunshine. | Lays principally in the shade of the animals. |
| 2. Causes cattle to "gad" both old and young. | Causes less annoyance, but chiefly in young animals. |
| 3. Lays its eggs principally when the animals are running. | Lays its eggs mostly when the animals are recumbent. |

*Presented in part before the Entomological Society of America in New York, December 1916.

| | |
|---|---|
| 4. The eggs are laid mostly on the out side of the hind quarters and on the legs above the fetlocks. | The eggs are laid on all parts which the fly can reach when resting on the ground, while the animals are lying down. Even when the animals are standing the fly is able to lay eggs on those hairs which are close to the ground, namely on the heels. |
| 5. The fly is a clumsy insect and strikes at the animals blunderingly. | The fly is much more gentle and deliberate in its movements. |
| 6. The eggs are laid singly at the roots of the hairs and are rarely visible without lifting the hairs. | Several eggs are attached to a single hair and are often visible without lifting the hair. |

Hatching of Eggs—Both species take about the same time to hatch—4 to 7 days. They will hatch with or without moisture on or off the animals at room temperature. In both cases the egg splits open at the top to allow the emergence of the larva.

Penetration of the Larva—This is a comparatively slow process taking several hours. The larva crawls down the hair and enters a follicle. In the case of *H. lineatum* it is probable that several larvae enter the same opening.

Skin Lesions.

| | |
|---|---|
| Hypodermal rash. An irregular scattering of round raised lumps, especially on the outside of the hind quarters, appearing suddenly. Anaphylactic in nature and rarely tending to suppurate. Very little exudation of serum. | Hypodermal rash. Diffuse irregular swellings, very irritable, appearing suddenly. Anaphylactic in nature, often large and ending in the production of pus and a marked dermatitis. The lesions follow the parts of the animal which come in contact with the ground. i. e., legs, flanks and sternum. A large quantity of exudate matting the hairs. |

It is a recognized fact that young animals are more heavily parasitized by Warble-flies than old ones. It is likewise noticeable that the older animals exhibit marked skin lesions, whereas young animals show but little evidence of the larval penetration. Evidently the older animals resist the larvae as they are penetrating the hide. These phenomena can be explained in the following way: The swellings are largely anaphylactic in character, seeing that they appear so suddenly, are very itchy, are edematous in nature and contain numerous eosinophilic leucocytes. It is worth noting that by the time the larvae reach the oesophagus they are

sterile, having evidently by this time disposed of any bacteria they may have carried through the skin. These edematous swellings are bacteria free but are crowded with eosinophiles, whereas the dermal swellings are frequently contaminated. This disposes of the principal visible points differentiating the two flies. There now remains to give a summary of the life history of these flies.

SUMMARY—*Hypoderma lineatum* lays its eggs as early as April 15th, but the usual laying period is during the month of May. At Agassiz they have never been captured later than May 30th. *Hypoderma bovis* begins in the early part of June and continues up to the beginning of August. Between the last appearances of *H. lineatum* and the first of *H. bovis* there is usually a period of ten days when the cattle are immune from attack of either species. *H. bovis* frightens cattle much more than *H. lineatum*. The eggs take about a week to hatch; the larvae bore through the skin in the coarser porous parts, taking several hours in the process; at this stage they are rather less than 1 mm. long. The lesions resulting from this penetration are caused partly by bacterial invasion and partly by anaphylactic reactions; those produced by *H. lineatum* being more severe. For the skin lesions I have proposed the name of *hypodermal rash*. At this point there is a hiatus in the life history as it is not positively known how the larvae reach the esophagus, where they are subsequently found; most likely they travel in the loose connective tissues under the skin up to the region of the throat and into the esophagus where the muscles bifurcate. Passing down the esophagus they follow the submucosa and are almost always found lying along the long axis of the canal. Whilst in the esophagus small edematous swellings are found surrounding the grubs, these are sterile and are anaphylactic in character, the exudate contains large numbers of eosinophilic leucocytes but no pus cells. The earliest record made at Agassiz was on August 15th, when a larva 3.4mm. was found and several slightly larger. According to Carpenter continental observers have found them smaller than this. *H. lineatum* makes its appearance in the backs of cattle about December 15th and *H. bovis* about a month later. The larvae at this time have grown to about 1.5cm. and are of the same size in the neural canal and under the skin which they have just reached. At this stage it is difficult to separate the larvae of the two species, but Mr. F. C. Bishopp has, I believe, discovered good distinguishing marks be-

tween the species. The life histories overlap at this period making it difficult to follow the migration, but in the latter part of the season (the middle of March) the last larvae to leave the gullet are at the paunch end. They pass out under the pleura and go to the neural canal either up the crura of the diaphragm or up the posterior border of the ribs entering the canal by the posterior foramen, from there they descend the canal under the dura mater, emerge again through the foramen and reach the back, forming the characteristic swellings commonly called warbles. The larvae follow connective tissue exclusively and no larvae have been discovered in muscular tissue. The mature larvae leave the animals' backs from the early part of the year up to the first days of July. The periods for the two species have not been fully worked out; but judging from what records we have of the pupal period and the time of year the flies are about, *H. lineatum* begins to emerge in February and finishes about May 1st. *H. bovis* begins about May 1st and ends approximately on July 1st. The average pupal period for *H. bovis* is 32.5 days and for *H. lineatum* a little less. The duration of the life of the flies is short seeing that they cannot feed. This life history applies to Agassiz, British Columbia; doubtless in other countries variations will be noticed, but the period spent by the larvae within the host must be of the same duration, seeing that animals' temperatures are the same the world over.

I am indebted to Dr. F. Torrance, Veterinary Director General, Canada, for leave to publish this paper.

## THE NEW PHARMACOPEIA*

H. J. MILKS, Ithaca, N. Y.

The United States Pharmacopeia is a book of standards, established by law, to which drugs and their preparations must conform. The first pharmacopeia of the United States was published in 1820 and it is revised every ten years by a committee of physicians and pharmacists. The preparations made according to it are *offcial*. The present 9th Decennial Revision appeared in August and became official in September, 1916.

*Presented at the Conference of Veterinarians, Ithaca, N. Y.

The pharmacopeia gives first the Latin title of the drug, followed by the English name, official abbreviation and synonyms. A short concise definition of the drug is given. This is followed by the characteristics and tests by which the purity and identity of a drug may be recognized and finally in what (human) doses it may be administered. Since it is intended as a short concise work of reference, it does not include all the material used in medicine nor does it go into detail concerning the one discussed.

This was the only official standard of drugs used up to June 30, 1906, when Congress passed the National Food and Drug Act. This act was soon followed by similar legislation in most of the states. These laws specify the United States Pharmacopeia and the National Formulary as the standards for drugs. The following is an extract from the National Law: "The term 'drug' as used in this Act, shall include all medicines and preparations recognized in the United States Pharmacopeia or National Formulary for internal or external use, and any substance or mixture of substances intended to be used for the cure, mitigation or prevention of disease of man or other animal." The standard of purity and strength, as given in the pharmacopeia is intended solely to apply to substances which are used in medicine or in determining the identity or purity of such substances.

The present 9th. pharmacopeia is very similar to the preceding yet many changes have been made in it. It is not the purpose of this paper to mention all those changes but only those of considerable importance to veterinarians.

Solubility. The reading of the solubitity of drugs has been changed from soluble in —— parts of water to 1 gram dissolved in —— mils of water. This has changed the solubility or apparent solubility to some extent. Thus iodine is soluble in 5000 parts of water or 1 gram of iodine dissolves in 2950 mils of water.

Purity. The purity rubric instead of reading a certain per cent. or not less than a certain percent. in many cases reads not less than —— nor more than. This change is made to meet reasonable requirements particularly in preparations of drugs and permits a slight variation either above or below the ideal.

Abbreviations. Abbreviations are given in order to have some official abbreviations for the convenience of prescribers and shop keepers.

One of the first and most important changes for veterinarians

is from c.c. cubic centimeters to mils. The word mil has superseded the term c.c. The reason for this was that the United States Bureau of Standards declared the cubic centimeter as a misnomer, as it evidently meant the thousandth part of a liter. (1 liter equals 1000.027 cubic centimeters). The term mil is derived from the first three letters of milliliter which it means. It is written with a small m and is not followed by a period. There is practically no difference between what was regarded as a c.c. so that it is simply necessary to remember the change in name.

ARTICLES ADDED. Some of the more important substances added are:—

| | |
|---|---|
| Aqua Destillata Sterilizata | Sterile Distilled Water |
| Beta Eucain Hydrochloridum | Beta Eucain hydrochloride |
| Bismuthi Betanaphtholas | Beta Naphthol Bismuth |
| Caffeinae Sodio-Benzoas | Sodio benzoate of Caffein |
| Creosoti Carbonas | Creosote Carbonate |
| Diacetylmorphina | Heroin |
| Emetine Hydrochloridum | Emetine hydrochloride |
| Hypophysis Sicca | Dried Pituitary body |
| Liquor Hyphophysis | Solution of Pituitary body |
| Liquor Sodii Chloridi Physiologicus | Physiologic salt solution |
| Magma Bismuthi | Milk of bismuth |
| Oleum Sesame | Oil of sesame |
| Oxygenium | Oxygen |
| Paraformaldehydum | Paraform |
| Phenolphthaleinum | Phenolphthalein |
| Potassa Sulphurata | Liver of sulphur |
| Quininae et ureae Hydrochloride | Quinine and urea hydrochloride |
| Serum Antitetanicum | Tetanus antitoxin |
| Sodii Cacodylas | Sodium Cacodylate |

ARTICLES DROPPED:—

| | |
|---|---|
| Argenti Nitras Mitigatus | Mitigated silver nitrate |
| Cataplasma Kaolini | Calaplasm of kaolin |
| Coca | Coca |
| Collodium Stypticum | Styptic collodion |
| Exilirum Ferri, quininae et Strychninae Phosphitum | Elixir of iron quinine and strychnine phosphite |
| Emulsion Olei Morrhuae cum hypophosphitibus | Emulsion of cod liver oil with hypophosphites |

Eight Extracts including those of aloes, and digitalis.

Thirty-eight Fluidextracts including those of Capsicum, Cocae, Phytolacca, Pruni Virgiana, Quassia, Stramonium, Mistura Rhei et Sodae. All the alkaloidal oleates. Physostigmine Sulphas, Plumbi Iodium, Sulphuris Iodium.

Five Spirits including: Aetheris Compositum, Ammoniae Compositum, Frumenti, Vini Gallici.
Ten Tinctures including: Aloes and myrrh. Ipecacuanhae et Opii.
Four Ointments including: Ung. Hydrargyri Oxidum Rubri, Ung. Potassii Iodidi. All the wines.

### Changes in Official Names

The following changes in the official Latin names were made:

| | |
|---|---|
| Cannabis Indica | to Cannabis |
| Aqua Hydrogenii Dioxidi | to Liquor Hydrogenii Dioxidi |
| Rhamnus Purshiana | to Cascara Sagrada |
| Hysocinae Hydrobromidum | to Scapolominae Hydrobromidum |
| Alcohol Absolutum | to Alcohol Dehydratum |
| Oleum Betuli and Gaultheria | to Methyl Salicylas |
| Veratrum | to Veratrum Viridum |
| Oleum Lavandri Flores | to Oleum Lavandri |

Changes in strengths of preparations: In general the strengths of the preparations remain about the same as in the 8th revision. All potent tinctures are still ten per cent and fluidextracts 100 per cent of the drug. Some of the standards for the alkaloidal drugs are apparently higher than before. This is because the assay calls for total ether soluble alkaloids instead of one alkaloid. For instance in the 8th revision, nux vomica was supposed to assay at least 1.25 per cent of strychnine, and in the new pharmacopeia it reads not less than 2.5 per cent of ether soluble alkaloids, which includes brucine as well as strychnine. Since brucine is present in almost the same proportion as strychnine there is little difference in the requirements. The dose has not been changed in the pharmacopeia.

Several drugs are recommended or required to be assayed. Among the former are preparations of digitalis and the latter preparations of cannabis.

Cantharis (cantharidis) is required to contain not less than 0.6% of cantharidin. This will insure the veterinarian of getting a good preparation instead of some of the poorer beetles.

Among the other changes are chapters on sterilization, diagnostic reagents and on biological assay.

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—Another case of anthrax was reported the last of May in a longshoreman at New York City. He had been handling raw hides and is believed to have caught the disease in that way.

# THE ETHICS OF THE PROFESSION OF VETERINARY MEDICINE*

C. F. Davis
Prof. of Veterinary Jurisprudence, Colo. Ag. College
Fort Collins, Colo.

To determine the proper attitude of man towards his creator forms the field for religious science. To determine his proper relations with his fellow men is the object of ethics.

Until men had made sufficient advancement in social grouping to begin to realize a conflict of interests there could not have arisen in their minds the question of what they ought or ought not to do with regard to those about them.

When, however, in their struggle for food or shelter, in their efforts to satisfy any desire, they found others endeavoring to secure the same things for which they themselves were striving there would of necessity arise the question of what they ought to do.

Whenever that question of ought, the question of what is right conduct between men is raised, men find themselves in the field of ethics.

In one sense what is right between men in general is right for a professional man whatever his profession. That is to say ,there is no special ethics of a profession. From another point of view every walk in life, inasmuch as it establishes different sets of relations between those who follow it and those with whom they come in contact, has its own peculiar ethical code.

From this view point we may justly speak of ethics of the medical profession.

From the standpoint of philosophy it may be said that the whole code of ethics is embraced in the rule of the conduct announced by Buddha, adopted by the Chinese teacher and repeated by the Christ—to do unto men as we would that they should do unto us.

But the abstract principle will not serve for the guidance of men in masses. There must be the statement of the law in concrete cases; hence men are constantly asking "what should be my conduct in this or that situation?"

To arrive at a fair answer to such question we should endeavor

*Read before the Colorado Veterinary Medical Association, Jan. 25, 1917.

to discover the origin of ethical laws. Why or how have men come to look upon one course of conduct under certain circumstances as right and the opposite conduct as wrong? Why do we, the descendants of ancestors who saw no impropriety in going entirely unclothed, accept as an ethical principle the demand that all men shall be fully clothed?

There seem to be two lines of thought, each of which has been accepted as leading to the correct answer to our question. One group of thinkers reason that in his development from barbarism to his present stage of civilization man has made many experiments in many fields. That those courses of conduct which have proved to be inimical to man's efforts to satisfy his ever increasing wants have been avoided, while other courses having been of assistance have been retained and insisted upon as right. When men, having dropped their roving, pastoral habits, settled down to a more or less crude form of agriculture and began to look upon the field in which a man had placed the seed and which he had protected from the destructive attacks of savage beasts and lawless men until the harvest was ready, as in some way being that man's private property, it would soon become manifest that the sense of ownership aroused an ambition to improve, to beautify and to remain upon the land. These are all social virtues which have contributed much to the progress of society and have, therefore, come to be looked upon as right.

The other group of thinkers prefer to look upon man as a creature of habit and to say that whatever men persist in doing until the habit of doing it has been formed they will continue to do and will finally come to consider the doing of it right and the omission of it wrong.

They point to the many actions, which, while they are made the subject of ethical rules cannot be said to be either advantageous to society or the reverse.

Whichever of these views we may choose to accept we will find it difficult to deny that that course of conduct which has come to be considered right between man and man is conducive of good results in that it serves as the lubricant to prevent friction in society.

One who enters upon the practice of a profession has a fivefold duty; he has his duty to himself, his duty to his profession, to his professional brethren, to those who employ him, and to

society at large. To himself he owes it that his conduct be such as to command the respect of all men. That he be recognized as one who has drunk at the fountain whence flows streams of pure wisdom.

To his profession is due that dignified attitude which will show that he harbors no thought that it requires an apology for having entered upon it.

The practice of veterinary medicine was for so many years given over to the blacksmith and the stable boy that people now find it difficult to believe that it has become an art requiring for its successful practice as thorough and careful preparation as that given to the practitioner whose efforts are directed to the healing of diseases to which humanity is heir.

Law, medicine and theology have long been known as the learned professions and the men who have practiced them have for centuries ranked among the leaders of thought and the patterns of right conduct in society. When the student of veterinary science essays to enter into companionship with such men on the footing of full intellectual equality he owes it to them and to himself to make himself worthy of that companionship. Any crudeness of manners, any lingering rudeness of the old-time "horse-doctor", any failure by his conduct to claim full recognition belonging to a polished and learned gentleman must result in his being looked upon as of less worth than the members of the well-established professions.

As to the duties of the veterinarian to others, from the standpoint of ethics, they differ in no way from those of the physician who gives his attention to the ills of humanity. I have found the ethical principles which have come to be recognized as binding upon members of the medical profession so well expressed by others that I take the liberty to make rather large quotations from their writings.

"It is perfectly ethical to advertise by giving your cards to those who employ you and to others who may at some future time need your services, but it is considered unprofessional to state where you graduated and how long you have practiced, either upon your cards or in the newspapers."

When you are the first to reach a case in which the excitement of alarm for the safety of the patient a number of doctors have been summoned, with no special choice among them, you

should promptly send a trusty messenger to cancel the call of the others and thus save them the unnecessary visit.

A decent respect for the opinion of the world should lead you to keep within the limits of good taste in everything, and to practice all that constitutes politeness in dress and deportment.

Signs and cards reading "practice limited to certain fields of practice" are perfectly ethical; but those that read, "special attention given to certain forms of disease" are not.

While it is perfectly just and proper to seek reputation by all legitimate means, and to embrace every fair opportunity to make known your attainments, all low intriguing and sensational scheming to obtain practice is unethical.

You should determine that in all your efforts you will play the man, from your diploma to your deathbed; that you will begin well, continue well, and end well; and will do nothing that is criminal, nothing that will not stand the strongest sunlight and the severest scrutiny; nothing for which you would hesitate to sue for your fee; and, if necessary, to stand up before a judge and jury to claim it; nothing, in fact, that you cannot approve of with your hand on your heart.

Nothing is more highly unethical than the exhibition of unprofessional tricks. The practice of medicine is an honorable calling and every person who enters upon it should resolve that it shall not be looked upon as in any way less honorable because he has adopted it.

Honor and duty require you to do right not only because it is good policy, but because of the higher reason that it *is* right.

Like every other physician, you will have friends to favor and extol you, and both secret and open enemies to oppose and decry you, and, although you can neither stop the tongues of the latter nor prevent their unfavorable criticism, still you should be careful that nothing be permitted to blast your reputation for upright, honorable conduct. Charges against your skill, unless very grave and damaging, had better be left unnoticed, or passed over with indifference.

One of the most unethical things that a practicing physician can be guilty of is to boast of the number of cases he has on hand or of the wonderful success that has attended his efforts.

The United States seems to be the only country in which there exists a written code of ethics for the medical profession.

It may be that other countries from long custom are able to dispense with them. But in this land where all social customs are still in the formative stage the very nature of society and the jarring of interests require that physicians shall have some general system of written ethics to define their duties, and, in case of doubt, to regulate their conduct toward each other and the public in their intercourse and competition.

Every individual in the profession is, of course, supposed to be a gentleman, actuated by a lofty professional spirit, striving to do right and to avoid wrong, and, even were there no written rules at all, the vast majority would conform to the rules of justice and honor.

The non-existence of a code would make it possible for unscrupulous practitioners to pounce upon the patients of well-bred physicians like hungry wolves, and to carry on a regular system of infringement, self-advertising, certificate giving, and wrongdoing in general, regardless of their rights, while those aggrieved would have no visible standard of appeal.

In view of these facts there has been adopted a code of ethics in this country which is recognized as binding upon every physician who is qualified and admitted to the practice of medicine.

While the provisions of this code have especially in view the conduct of those who treat the human patient, its declarations are so obviously founded upon principles of right and justice that it should with a few modifications, be adopted by the profession of veterinary medicine.

"Professional morals are an important part of medical education, and it is as necessary for every school of veterinary science in America to give to each alumnus a copy of the written moral code of his profession as it is to confer upon him his doctorial degree."

Good morals require that when called upon to attend a case which has been previously under the care of another physician, especially if the owner of the sick animal is dissatisfied with his treatment, or if the case is likely to prove fatal, that you be carefully just. Do not disparage the previous attendant by saying it is too late, and expressing a wish that you had been called in sooner, or criticise his conduct or his remedies.

Seek to enhance your profession in public esteem at every fitting opportunity, and also to defend your brethren and your profession when either is unjustly assailed.

There are a thousand unwritten ways to show an ethical spirit and a thousand undefinable ways to evince an unethical one.

Medical quarrels are a disgrace to the profession. Do not captiously follow up every trifling infringement, difficulty, or apparent contradiction, as if you courted a war with everybody for what you may be pleased to call your rights.

"With professional honesty for your pilot, be firm in your determination to steer clear of all practices and alliances in which your part would not bear legal scrutiny or detailing in the community; and you will not only safely pass the rocks of shame and the whirlpool of bitterness which have wrecked so many of your profession, but you will have that highest of all rewards—the approval of your own conscience.

Every science has its difficulties. Even in mathematics there is no such thing as a perfectly straight line, or exact sphere, or perfectly plane surface. The science of the law, or at least the practice of the science, seems to be based upon the uncertainties by which it is befogged. Religion has its numerous creeds and opposing systems of belief. What wonder, then, since it is a human institution, that there are differences of opinion in medicine?

"The truth is, however, that physicians personally are far more imperfect than physics."

In closing, I think I can do no better than to read the oath of the physician, said to have been formulated by the father of medicine nearly two thousand years ago. It reads as follows:

"I swear by Apollo the physician, and Aesculapius and Health and All-heal, all the gods and goddesses, that, according to my ability and judgment, I will keep this oath and this stipulation to reckon him who taught me this art equally dear to me as my parents, to share my substance with him, and relieve his necessities if required, to look upon his offspring in the same footing as my own brothers, and to teach them this art, if they shall wish to learn it, without fee or stipulation, and that by precept, lecture and every other mode of instruction, I will impart a knowledge of the art to my own son, and those of my teachers and to disciples bound by a stipulation and oath according to the law of medicine, but to none others.

"I will follow the system of regimen which according to my ability and judgment I consider for the benefit of my patients, and abstain from whatever is deleterious and mischievous.

"I will give no deadly medicine to any one if asked, nor suggest any such council, and in like manner I will not give to a woman a pessary to produce abortion.

"With purity and with holiness I will pass my life and practice to my art. I will not cut a person who is suffering from a stone but will leave this to be done by men who are practitioners of this work.

"Into whatever houses I enter, I will go into them for the benefit of the sick. I will abstain from every voluntary act of mischief and corruption; and, further, from the seduction of females or males, of freemen and slaves.

"Whatever in connection with my professional practice, or not in connection with it, I see or hear, in the life of men, which ought not to be spoken abroad, I will not divulge, as reckoning that all such should be kept secret.

"While I continue to keep this oath unviolated, may it be granted to me to enjoy life and the practice of the art respected by all men in all times! But should I trespass and violate this oath, may the reverse be my lot!"

## CLINICAL AND CASE REPORTS

**"Knowledge is born in laboratories and in the experience of the thoughtful. It develops form in the journals and 'when dead it is decently buried in books'."**

### NEW TREATMENT FOR WOUNDS AND BURNS.*

H. C. CAMPBELL, V.M.D., University of Pennsylvania
Philadelphia, Pa.

While associated with the H. K. Mulford Co., of Glenolden, Pa., as veterinarian from 1903 to 1908, I became interested in a dusting powder for the treatment of wounds, recommended by J. J. Kinyoun, Director of the Biological Laboratories. This powder consisted of dried or evaporated tetanus serum of a low value, mixed with 5% to 10% thymol iodide (aristol). I used this powder on a number of occasions on minor wounds which occurred

*Presented at the meeting of the Keystone Veterinary Medical Association, May 8, 1917.

from time to time among the attendants and also upon animals. The rapidity with which the wounds healed led me to believe that this powder had more virtue than the ordinary pharmaceutical dusting powders.

Since this powder contained tetanus antitoxin, a few experiments were conducted to determine whether or not it would prevent tetanus along with its healing properties. Deep scarifications were made upon a number of guinea-pigs. Tetanus organisms were planted upon the wounds and one-half received the dusting powder while the other half remained as controls. In all pigs in which the powder was used upon the wounds they healed rapidly and developed no tetanus. In the other half, the wounds sloughed and the pigs developed tetanus.

Being impressed with the rapidity with which all the wounds healed when this powder was used, I thought that the serum might have some virtue as a wound healer. Later, while associated with the Veterinary Department, University of Pennsylvania, I concluded to try normal serum mixed with thymol iodide (aristol) as a remedy for healing wounds. I prepared a preparation and gave it to several practitioners who reported that it gave good results, but objected to its being in the form of a liquid. Their reason being that a sufficient quantity would not adhere to the surface of the wound. We then tried to incorporate the serum in some substitute which would assume the consistency of a salve. For this purpose tragacanth was used and then mixed with linseed oil, lime water and petrolatum.

The following formula was adopted:

| | | |
|---|---|---|
| Thymol Iodide | drams | 4 |
| Serum | ounces | 5 |
| Linseed Oil | ounces | 2½ |
| Lime water | ounces | 2½ |
| Tragacanth | grains | 120 |
| Petrolatum | ounces | 2 |

Add serum to the tragacanth and allow to stand 24 hours. Dissolve the thymol iodide in the linseed oil and make an emulsion with the lime water, then mix the emulsion with the serum and tragacanth and lastly add the petrolatum and mix thoroughly.

After incorporating the serum and thymol iodide with the tragacanth, linseed oil, lime water and petrolatum, it occurred to me that the mixture might be beneficial for burns. Burns were

treated on a number of occasions with very good results. The following is a brief history of one case:

A man about forty years old had both hands badly burned while trying to extinguish a fire in his barn in 1914. The patient was immediately taken to the hospital and the usual saline treatment applied. About the third or fourth day I asked permission to treat one hand with the above preparation. Both hands were in about the same condition. The man claimed to get immediate relief in the hand on which this salve was applied. The wound healed more rapidly and left scarcely any scar tissue as compared with the other hand. Using the patient's own words, he said: "I never had such relief. If I ever have to be treated again for burns, this salve is what I want, regardless of price."

Since that time the salve has been used on a number of burns with good results. Dr. E. T. Booth and Dr. Wm. H. Ivens, two veterinary practitioners in the city of Philadelphia have both used the salve on a number of wounds and burns and report excellent results. Dr. Booth reports a case of a horse having bed sores with ragged undermined edges in which he used this salve. He states that he never had any other preparation prove more satisfactory on wounds of this character.

It has been my belief for some years that blood serum aided in the healing of wounds.

Now that wounds and burns are so prevalent among soldiers and horses in the war zone I thought I would present this article to the profession.

Recently an article appeared in the *British Medical Journal*, January 13, 1917, page 37, describing the treatment of burns with paraffin, which was introduced by Dr. De Sandfort, a French Army Surgeon, who called the preparation he used "Ambrine".

It is not the object of the writer to discredit the paraffin treatment for wounds or burns, but I am of the opinion that if serum could be incorporated with the paraffin it may greatly facilitate the treatment of wounds and burns.

## TWO CASES OF MUMMIFIED FETUS

WALTER M. PENDERGAST, Syracuse, N. Y.

CASE No. I. On January 15, 1916, I was called to examine a large pure bred Holstein cow for pregnancy.

HISTORY. This cow had aborted about a year previous to this time and was bred in April 1915. She had not been in estrum since and the owner supposed she was pregnant.

This cow was very large and in high condition. Upon examination per rectum I discovered that the uterus was drawn forward and downward so that the horns and ovaries could not be reached. I advised the owner that there was probably a fetus in the uterus and that we had better wait about two months before going further. On April 14, 1916 I was again called to examine the cow but did not discover anything different from the first visit. I placed uterine forceps on the os and pulled the uterus as far as possible. Then with my arm in the rectum and two assistants drawing on the forceps, I was able, after inserting my arm the full length, to just touch a hard object in the uterus. The uterus did not feel like a normal pregnant uterus in that it did not seem to contain any fluid. The os appeared to be sealed. I inserted a dilator in the os, after which I inserted a catheter in the uterus and injected about a quart of 2% Lugol's solution, most of which was retained in the uterus. The following afternoon this cow gave birth to a mummified fetus about fifteen inches long. The fetus was dry, hard and blackened but did not seem to have any odor.

After about two weeks the uterus of this cow was treated with 2% Lugol's solution twice at intervals of about ten days. She came in estrum about six weeks after the delivery of the calf and was bred. She came in estrum again about two months later and was bred again and at the present time is very heavy with calf.

CASE NO. II. On May 8, 1916 I was called to hold a post-mortem on a Holstein heifer two and one-half years old. This heifer was very fat and the history was that she had been bred about a year previous and had failed to get with calf.

Upon post mortem I found a mummified fetus about eight inches long. There did not seem to be any fluid in the uterus and the walls of the uterus seemed to cling very closely to the fetus.

The man who slaughtered this heifer stated that he had discovered this condition in only a very few cases in the many hundreds of cattle that he had slaughtered and also stated that he always had found the cows to be very fat and in fine condition.

## DERMATO-MYCOSES IN CALVES

JUAN VARAS CATALA, San Juan, P. R.

While inspecting calves in a dairy stable, property of Felix Rodriguez at Bayamon, Porto Rico, my curiosity was aroused by many large greyish-white scabby spots, which had attained the size of the palm of the hand and some even larger, on the neck, face and body of twelve calves. I removed some scabs, finding underneath ulcerous indentations filled with pus. The attendant informed me that the spots had been on said animals for a long time; that all kinds of treatment was given without results, and that he had contracted the same disease, curing himself with applications of tincture of iodine.

After I got through examining carefully every sick animal I realized that in order to arrive at a definite diagnosis it was necessary to examine microscopically material obtained from the diseased part. Therefore, with a scalpel, I collected some scrapings from the different animals in test tubes which were partly filled with chloroform, and had them shaken for a little while. After the chloroform was poured off, the sediment left was mixed with a 33½% solution of sodium hydroxide; then the fluid sediment was mounted on slides, using cover-glasses, and examined under a powerful microscope with a dry lens, finding a beautiful field of threads and spores of the *Tricophyton tonsurans* which as is known, is the cause of herpes tonsurans.

I immediately ordered the separation of the diseased calves from the healthy ones, quarantined them, and recommended the treatment of the affected part with tincture of iodine.

## AZOTURIA

### SARCOLACTIC ACID RETENTION AS ITS CAUSE

H. S. EAKINS, Fort Collins, Colo.

Having been more or less constantly interested in azoturia of horses, I have noted the various opinions regarding its etiology as expressed by certain German and American authors.

In the B. A. I. Circular 192, page 372 there is an item about lymph vessels "coursing as intricate and extensive networks in

practically all tissues excepting muscle bundles (but they do not exist in the intermuscular sheaths)".

Referring to Albert P. Matthew's book on Physiological Chemistry, the following may be gained: glycogen is stored up in the liver and in the muscles which contain considerable amounts, horse muscle containing 0.5%. The presence in sausage of horse meat may be detected microscopically by the iodine test, showing a brown reaction. The amount of glycogen in muscles may depend on age and other conditions. Diet may influence it. In weak animals there is less glycogen in the muscles. The liver and muscles may convert glycogen into glucose and may destroy glucose, this being under the control of a special internal secretion of the adrenal gland. Glycogen is reduced from muscles during work or other strain. During this period a great diminution of glycogen may take place, which may be converted into glucose, then oxidized. The energy used by muscles during work may thus be produced by the combustion of glycogen. Most of the sugar burned in the body is burned in muscles, thus warming and invigorating the animal. Exposure to cold stimulates glycogenolysis, because glucose is required for fuel. The skeletal muscles are affected indirectly by nerve impulses to the suprarenals. Suprarenal glands set free substances which markedly affect the metabolism of muscles. Glycogen disappears rapidly from the liver and muscles under exhaustion, due to discharge of adrenalin, from adrenal glands, into the blood. This may also obtain accompanying emotions, fright, extreme vivacity, excitement, muscular exertion, etc. This promotes liberation of the carbohydrate in a condition for rapid burning. By the transformation of glycogen into glucose, large stores of fuel are placed at the disposal of muscle tissue. Psychic nerve impulses, and those due to cold, excitement, vivacity, or to muscular exertions may cause great catabolism, liberating energy, and may stimulate chemical changes of a formative nature. Many acids and other substances are formed from carbohydrates by oxidation. Sarcolactic and succinic acids are produced during muscular work, and acetone in large quantities during fasting. Usually sarcolactic acid is removed as rapidly as it is formed if oxygen is present. If oxygen is restricted accumulation may occur and acidity result. If the *oxidation* or the *removal* of lactic acid is prevented, the muscle remains shortened, "rigor mortis". Such rigid muscle fibres if placed under work strain may rupture. Deprivation of oxygen leads to the conversion of glycogen into sugar."

From the above many ideas may be suggested. Reviewing the usual history of a case of azoturia: during rest periods glycogen is stored in the liver and muscle tissue, while at work consumption of glycogen increases. Nervous phenomena due to different factors as already elaborated, may be sufficient to induce the discharge of adrenal substances into the blood in large quantities. ( Proteid metabolism and pancreatic substances should also be considered.) Glycogenolysis obtains, and there appears not to be any control presiding over the quantity reduced in a short time. "Rapid burning" results with the formation of acids (especially sarcolactic) and other products. Oxygen may be utilized, deviated or too small in amount to further reduce the acids, (so-called tissue asphyxiation). There is a poor lymphatic (efferent) supply obtaining especially in large muscular areas, so that resulting is a stasis of metabolic products with rigor of muscles. These muscle fibres will rupture if exertion is forced; there may be a dissolution out of muscle hemaglobin, inflammation and retrograde changes, all of which can easily be accounted for. Cold is not essential to produce this condition, but it may have influence. Chill is a relative term and may obtain in warm weather secondary to the increased muscular combustion. Age, breed, and conditions of disease may have their effect. The liver is of great influence in surcharging the blood with carbohydrates thus aggravating the condition. If the above ideas are correct, investigation should be accorded the therapeutic value of adrenalin in cases of azoturia.

## PREPUTIAL CATARRH IN A DOG

H. J. Milks and W. E. Muldoon, Ithaca, N. Y.

Patient was a male brindle and white bull dog about four years of age.

History. The owner gave an indefinite history of digestive disturbances and had administered about one-half ounce of castor oil the day before with good results.

Symptoms. The pulse, respirations, and temperature, as well as the eyes were normal. There was a peculiar twitching of the skin over the back particularly in the lumbar region which appeared to be rhythmic but having no connection with the pulse or respirations. On palpation of the abdomen nothing abnormal was made out except when the prepuce was handled, the twitchings of

the back were more pronounced. The animal was given a small amount of an intestinal antiseptic and one-half ounce of castor oil which was later vomited. No further treatment was given but the animal was brought to the hospital three days later, the owner advising that the twitchings of the back were more pronounced.

DIAGNOSIS. On making a close examination of the prepuce, the mucous membranes were found to be reddened and the inner wall of the prepuce and the bulbous portion of the glans were covered with small papillary excrescences. A diagnosis of preputial catarrh was made and the following treatment given:

TREATMENT. The prepuce was thoroughly cleaned with repeated sluicings of luke warm water and hydrogen peroxide daily, and for two days a ten per cent solution of argyrol was injected. On the third and fourth days of treatment one per cent solution of silver nitrate was injected and for the following five days a twenty per cent solution of argyrol was used. At the end of this time the catarrhal condition had entirely cleared up and the twitching of the back had subsided.

## A NEW WORLD'S RECORD FOR THE HOLSTEIN

F. D. WALMSLEY, Utica, N. Y.

While working the territory in the immediate vicinity of Richfield Springs, New York, the writer heard from time to time, rumors of a strange freak in the form of a calf that gave milk. From one day to another our curiousity was aroused until we decided to see this animal, so on May 22nd, having some work near the farm on which this calf was born, we decided to investigate the story. We drove to the farm owned by Mr. Reed, a lawyer of Richfield Springs, were graciously received and viewed this "wonder" for such was the case. This unnamed calf, through whose veins coursed the blood of the great Dekols, was born March 16th, 1917, Sire, King Kalsora Lyons No. 158785 H. F. H. B. and Dam, Piebe Marjoran Dekol 2nd. No. 212566 H. F. H. B., making the calf eligible for registry in the Holstein Friesian Herd Book. The calf in question was a black and white with a white marking in the forehead. When the calf was dropped, the son of the tenant on the farm noticed that the udder was enlarged and called his father's attention to the fact but little was thought of it until the next morning when a neighbor was in the barn who also exclaimed in wonder at

the strange sight of quite a good sized udder on a calf of twenty-four hours' life, also prevailing upon the man to milk the udder out for relief to the calf. This was accordingly done and about a pint of milk was taken from this udder. This went on from day to day about the same when the tenant undertook through the use of camphor, to dry up the udder. This availed him practically nothing so he commenced to milk the calf as a part of the daily chores around the barn and when the writer called, we milked the calf, getting about the usual amount, of which we took a sample for the Babcock test. On the next morning, this sample with a check was tested and the butter fat content measured 5%. This butter fat content measured by the fact that the calf gives about a pint of milk per day would figure about ½ pound of butter for seven days, which we believe is an unofficial Worlds Record for an animal of this age.

## FIBRINOUS ENTERITIS IN A HEN

B. F. Kaupp, West Raleigh, N. C.

History. The subject was a single comb Rhode Island Red hen two years old, a member of a town flock. This hen had been setting for two weeks. She appeared ill and left her nest and occupied the corner of a building refusing to pay any attention to the eggs. In walking the legs were jerked up under the body, movements became more difficult and the hen died.

Protocol. *Autopsy.*—The unfeathered portions of the head appeared normal. The carcass was in a fair condition of flesh. The feathers were in a rather unkempt condition. The proventriculus and gizzard were packed with woody grass and hay. This mass completely obstructed the parts and interfered with the normal functions of these organs. The hay extended through the duodenal opening from the gizzard so that this part no longer controlled the kind of material to be allowed to pass into the small intestines. There were hay, pebbles and shell throughout the length of the small intestines and at one point a short distance from the juncture of the small and large intestines as indicated at 2 number I, there was an obstruction which occluded the small intestine. There was an intense inflammation at this point. As a result of the irritation caused by the rough material allowed to pass the gizzard into the small intestines there was an enteritis which involved the entire portion of the small intestines. See figure number I.

MICROSCOPIC STUDY. Specimens of different sections of the intestines were saved hardened in formalin and stained with hematoxylon-eosin and clarified in beechwood creosote for study. Figure number 2 gives a photomicrograph and an excellent illustration of the pathological process. Number I is the serous covering of the bowel. Number 2 is a cross section of the longitudinal muscular coat. Number 3 is a section through the circular muscular

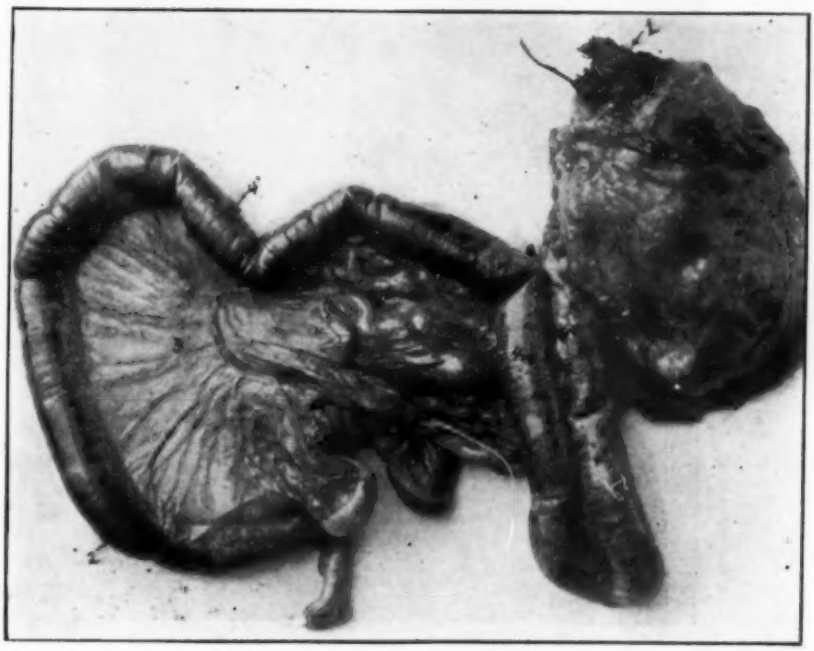

FIGURE No. 1. The opening of the proventriculus into the gizzard. (Note obstruction of the part with hay).
No. 2. Point of obstruction. (Note the intense inflammation).
No. 3. Mesentery.
No. 4. Inflammation and hemorrhage.

fibers and the thickest muscular coat of the bowel. Number 4 is the muscularis mucosa and 5 the stroma. Number 6 is the glandular structure which at this portion is the tubular variety. At number 7 there is noted a condition of cloudy swelling and cellular necrosis. Number 8 shows the intensely cellular infiltrated portion consisting of polymorphonuclear leucocytes and mononuclear cells. Number 9 is a mass of fibrin thrown out on the mucous surface of the bowel. At the point where the mass of course hay obstructed the bowel there was erosion and masses of fibrinous exudation.

SUMMARY. There is here given a study of a case of fibrinous enteritis of a hen.

This fibrinous inflammation is apparently due to the irrita-

FIGURE No. 2. Fibrinous enteritis of a hen. Photomicrograph.
No. 1. Serous coat.
No. 2. Longitudinal muscular layer.
No. 3. Circular muscular layer.
No. 4. Muscularis mucosa.
No. 5. Stroma.
No. 6. Glands.
No. 7. Ulcerated gland.
No. 8. Cellular infiltration.
No. 9. Fibrinous exudate.

tion caused by coarse, rough material finding its way out into the intestinal tract. This passage of material was made possible by the mechanical interference of the function of the gizzard.

Coarse hay and straw as well as sticks may cause obstruction to the digestive tract of the fowl.

# ABSTRACTS FROM RECENT LITERATURE

AN UNUSUAL ACCIDENT.—J. S. Woodrow, M. R. C. V. S. *Veterinary Record.*—A three year old filly, while being "mouthed" was found to have her tongue through the center ring of an ordinary mouthing bit. The tongue in front of the ring was swollen and protruded some six inches. The ring formed a severe constriction upon the organ. The filly was hard to handle and to relieve her, it was necessary to chloroform her. This was done with some difficulty as the animal struggled, but finally became quiet. The remainder of the operation was easy. The ring was filed in two, the tongue scarified and dressed with a mild astringent. Recovery soon followed. LIAUTARD.

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SALVARSAN IN THE TREATMENT OF CANINE DISTEMPER. Curt Krocher. *Zeitschrift f. Hygiene u. Infektionskr.*—As a result of very extensive experimental work on the effect of intravenous injection of salvarsan for the prevention and treatment of canine distemper, the author came to the following conclusions: 1. As a result of disagreeable after effects the intramuscular and subcutaneous injection of salvarsan these methods were employed only in a few cases. 2. The intravenous method should be preferred in the dog. 3. The saphenal vein is not adopted for the injection and the infusion may be more readily accomplished in the jugular vein. 4. An infusion apparatus should be preferred to the Record syringe. 4. Dogs show no ill effects from the injections of 0.01 to 0.025 gm. per kilogram of body weight in a dilution of 0.1 gm. to 25–40 c.c. and of alkaline reaction. 6. The administration of larger doses may cause intoxications, as 0.08 gm. per kilogram of body weight produced distinct symptoms of poisoning. 7. Heart weakness, marked pneumonia, gastro-intestinal disturbances, pregnancy, spasms, general debility, probably also nephritis are contra indications. 8. Salvarsan has no preventive action on canine distemper. 9. Salvarsan does not exert a curative nor a favorable action on the course of canine distemper: a. The symptoms of the nervous form of the disease are eventuated by the treatment with salvarsan. b. The pneumonia which develops in the course of the disease is not influenced by salvarsan injections. c. The same applies also to the gastro-intestinal affections, in fact salvarsan appears to increase the irritation on the

excretions of the gastro-intestinal mucous membrane. 10. Salvarsan has no effect upon the pustular exanthema of the skin accompanying distemper. The appearance of new pustules is not prevented thereby. 11. Likewise there was no curative effect observable on the parenchymatous keratitis which appears as a secondary manifestation to the disease. 12. Following the infusion the temperature usually rises in the first hours by 0.1–1.6°C and soon again drops to about its former height. In few cases a fall of 1°C. was observed, but the fever gradually rose to its previous level. 13. Due to the escape of the salvarsan solution a transitory irritation of the tissue developed at the point of puncture. 14. Some of the patients disclosed marked restlessness, pain, depression, inappetence and diarrhea following the infusion. 15. The feces and urine contain arsenic soon after the administration of salvarsan. 16. The results of the urine examination proves that larger doses of salvarsan may produce an irritation of the kidneys.

EICHHORN.

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FRACTURE OF PEDAL BONE—OPERATION—RECOVERY. Capt. F. Chambers, A. V. C. *Veterinary Record.*—An artillery charger was struck by a motor on the outside of the foot. He became very lame and showed, after a few days, a greatly swollen coronary band with fetid pus escaping. Cast and chloroformed so as to examine the foot and judge the depth of the injury, the introduction of a probe detected a crack in the os pedis. An operation upon the hoof and laminae permitted the extraction of a piece of bone, one inch long and one-half inch wide. The articulation was not involved. The wound was dressed with tincture of iodine, packed with gauze and bandaged. Lameness was very severe for several days after but gradually the suppuration diminished and the wound healed beautifully. Foot baths daily, dressing with cyanide gauze with eusol solution, chloride of calcium and boric acid formed the whole treatment.

LIAUTARD.

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RUPTURED UTERUS IN A COW. Hugh Fraser. *Veterinary Record.*—A farmer congratulating himself on the easy way he had delivered a dead fetus from an abnormal parturition, called the writer to see the mother. He found her down but able to get up easily, giving occasional grunts and having the abdomen quite too large for a cow newly calved. She had tympanitis and a tempera-

ture of 104°F. On examining the genitals the membranes were found coming away easily and when they were removed a large rupture in the upper wall of the uterus was exposed. Being in a fat condition the cow was slaughtered. LIAUTARD.

A NON-GAS-PRODUCING STRAIN OF THE HOG CHOLERA BACILLUS ISOLATED FROM AN OLD LABORATORY CULTURE. C. Tenbroeck. *Journal of Experimental Medicine*, Vol. 24, pp. 213-222, 1916.—It is not uncommon to find minor variations among strains of the same species of bacteria, and in cultures that have been kept for several years on artificial media such changes are relatively frequent. It is seldom, however, that one finds a variation in the action on the more commonly used carbohydrates. A review of the literature shows that non-gas-producing paratyphoid strains have been reported by Dorset and other investigators before.

In a stock culture of the hog cholera bacillus (*B. suipestifer*) which was passed through a series of rabbits 14 years ago, an organism was found that differs from the original culture in that it fails to form gas from the carbohydrates that are usually attacked by this organism, while acid formation persists. This new strain is agglutinated by an anti-hog-cholera bacillus serum (but not by anti-typhoid serum) and produces in rabbits and mice a disease similar to that caused by the typical culture. The failure to form gas has persisted over a period of 18 months and all attempts to cause the strain to revert to the original condition have failed. It resembles in many respects *Bacillus typhosus* and it may be that some of the so-called typhoid cultures that are not agglutinated by anti-typhoid serum are non-gas-producing paratyphoids. Attempts to produce a similar change in a more recently isolated culture of the hog-cholera bacillus by means of animal passages and changes in the environment have been negative. BERG.

In the *Journal of the A. V. M. A.*, October 1916, pp. 75-78, I called attention to a controversy between Standfuss and Joest on the hog cholera problem. Standfuss claimed that there is a disease of young hogs, which he called swine typhoid, and which is different from hog cholera. Its etiological agent, the swine typhoid bacillus although similar to *Bacillus typhosus* in its cultural characteristics, can be sharply differentiated from the paratyphoid group.

Joest maintained that swine typhoid was not a disease distinct from hog cholera and that Standfuss' swine typhoid bacillus

was nothing more than an atypical strain of *B. suipestifer* (which is a member of the *B. paratyphosus B* group) several of which atypical strains Joest had described years ago.

Standfuss' strain was not agglutinated by paratyphoid serum (hog cholera serum) while Tenbroeck's strain was; in this respect the two strains differed.

From a typical culture of *B. suipestifer*, Tenbroeck has apparently obtained an atypical strain similar to, if not identical with, the swine typhoid bacillus of Standfuss. This tends to substantiate the claims of Joest. BERG.

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TRICHLOR-TERTIARYBUTYL ALCOHOL ANESTHESIA. L. W. Rowe. Reprint from *The Journal of Pharmacology and Experimental Therapeutics*, Vol. IX, No. 2, November 1916.—This compound was discovered in 1881. Since 1895 it has been used as an anesthetic for laboratory use. In 1899 the compound was made practical and was placed on the market under the name "Chloretone." It has marked hypnotic, anesthetic and antiseptic properties. It has a prolonged action on the human subject and so is not advocated as an anesthetic in human surgery. It has proven ideal in experimental physiology or pharmacology where the recovery of the animal is not essential. Blood pressure is not affected and there is a very steady plane of anesthesia. A 40% solution of the drug in partial alcoholic solution does not cause much local irritation when injected hypodermically. The dose for a dog is 0.4 gram per kilogram body weight. 0.3 gram per kilo. will do but is not so rapid in action. The drug is injected into the peritoneal cavity, the injection to be made well forward toward the diaphragm. In about five minutes the animal is restless and shows some muscular incoördination. Complete anesthesia is obtained in about twenty minutes. Reflexes entirely disappear. The dose is easily administered and requires no further attention. The anesthesia is well suited to blood pressure work or experimental surgery. Morphine narcosis followed by one-half the standard dose will insure the recovery of the animal if it is so desired. HAYDEN.

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PUNCTURED WOUND OF THE HOCK IN A CART MARE. G. Mayall, M. R. C. V. S. *Veterinary Journal*.—A black mare, 7 years old, got a kick on the outside of the near hock. She was kept at work and three days after there was a discharge of blood and pus from it.

After preparation of the region, strong solutions of iodine were made and injections prescribed three times a day. Following this, the mare was very lame and showed much pain. After two days slight improvement was noticed. The discharge was less. The mare was then put in slings and submitted to cold water irrigations half an hour three times daily, with injection of Lugol's solution and glycerine. The treatment was kept up for some length of time but recovery followed and the mare was able to return to work. This form of treatment is highly recommended by the writer.

LIAUTARD.

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ENORMOUS COCCYGEAL ARTERIO-VENOUS DILATATION IN A STEER. Piot Bey. *Rec. de Medecine.*—A six year old steer had an arterial hemorrhage from a swelling about 12 centimeters from the extremity of the tail. It was quite abundant and was readily arrested with a bandage. The steer was in good condition and presented no indication of illness, except the size of the tail which from the ischial arch was quite enlarged, and where the swelling existed was as big as a hen's egg. The terminal end of the organ was normal. The swelling was hairless, had the sensation of arterial pulsations but was not an aneurism. It was a large glomerule which had a very large venous network through which weak pulsations were also felt. It might be considered an arterio-venous aneurism. The steer was not destroyed for some time. When it was, the tail was secured and injected with coloring wax and tallow for dissection. At a short distance from the amputation, the artery was found dilated and remained so to the inferior part of the organ. The walls were thick and the vessel formed numerous circumvolutions. There were two enormous veins, anastomosed by several branches running from one to the other, on the posterior face of the caudal appendix. The other structures of the tail were normal.

LIAUTARD.

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NOTES ON THE OCCURRENCE OF EQUINE SPOROTRICHOSIS IN MONTANA AND THE "BLASTOMYCOTIC" FORM OF SPOROTRICHIUM SCHENCKI-BEURMANNI. K. F. Meyer. Reprint from the *Proceedings of the Society for Experimental Biology and Medicine*, 1916, XIV, pp. 23-24.—Sporothrix schencki-beurmanni was isolated on Sabouraud medium from fresh pus collected from a case of equine sporotrichosis. The growth on glucose agar remained white, be-

coming thick, moist, very stringy and inelastic. Sabouraud's agar showed a typical well-pigmented folded film. Microscopic examination of the cultures showed oblong, oval or round, short, moniliа-like mycelia with double membrane and refractile granules. There was some reproduction by budding. The cultures appeared like yeast or saccharomyces. "Blastomycotic" pleomorphism occurs in the European as well as the American types. Sera of infected or immunized animals gives the complement fixation test when yeasts are used as antigens. HAYDEN.

COMPLICATIONS. C. W. Cartwright, M. R. C. V. S. *Veterinary News.*—This is the record of an uncommon series of complications that occurred in a cross-bred cow, which fortunately was in good condition and whose robust constitution allowed her to be sold at a great price.

Attended first for slight digestive trouble, she required care for calving. She was due in ten days and was delivered of two living calves without difficulty. Septic metritis set in and while treated for this, laminitis of a metastatic nature attacked all four feet. Scarcely recovered from that, acute mammitis of the hind quarters set in with its consequences. Pneumonia of both lungs, particularly the right followed. All hope for her recovery seemed remote. Yet she rallied and resolution was commencing, when from persistent coughing, due to some liquid entering her trachea while being drenched, and accompanied with rupture of the lung tissue, she had a large emphysematous swelling on the right side, extending from the neck to the hip and covering the neck, shoulders, ribs and loins. Notwithstanding all this, she slowly showed signs of improvement, got a good run to grass, and with this and good food, she finally made a good recovery.

The general treatment was quinine, stimulants and free use of nuclein, iron, nux vomica and general tonics.

LIAUTARD.

CLINICAL NOTES. J. Bouwon. *Veterinary News.* A case of *strangulation of the intestines in a pony.* A concise record where the manifestations were, to the writer, justifiable of a diagnosis of volvulus. The pony died after a short illness. At the post-mortem there was found a strangulation caused by a tumor having a

thick wall of connective tissue which was afterwards examined and reported to be a lipoma. LIAUTARD.

LAMENESS IMPLICATING THE LEVATOR HUMERI. H. Taylor, F. R. C. V. S. *Veterinary Record.*—An interesting case which differs from the general history of shoulder lameness because with it the true lesion was readily recognized. The subject was a butcher's cob, driven in the usual careless manner, and in rounding a corner suddenly slipped, made an effort not to fall and was found suddenly very lame. On examination, the diagnosis of shoulder lameness was made, and in this case it was positively located. The slightest tap with the middle finger on any portion of the levator humeri caused a violent contraction of the muscle and the shoulder joint was jerked forward and inward. No matter where the tap was applied, in the course of the muscle, the manifestation of pain was the same. There was no other noticeable lesion or swelling, only this extreme sensibility of the muscle.

The treatment and result is not explained by the author.

LIAUTARD.

INTERNAL STRANGLES. Capt. Chambers, A. V. C. *Veterinary Record.*—A bay mare was sent to a military hospital as having pneumonia. The diagnosis was not confirmed and she was placed under observation, whereby the various temperatures and manifestations of great weakness, internal abscesses were suspected. She died after eight days of sickness.

*Post Mortem.* In the abdomen, the stomach was observed adherent to the spleen, which was greatly enlarged and attached to the diaphragm. The liver was of normal weight but studded with multiple abscesses. One was found in the spleen containing about one quart of pus. The organ itself weighed 28 pounds and was a mass of small purulent collections. The thoracic organs were normal. Smears of the pus of the liver and spleen revealed streptococci. The temperature during the disease varied between 104° and 105°F. LIAUTARD.

ABSCESS BELOW THE SIXTH AND SEVENTH CERVICAL VERTEBRAE IN A COW. J. Bouwon. *Veterinary News.*—This animal, about 10 years old, had a good appetite, normal kidney functions, but had difficulty in lying down and getting up. She was, however, much

emaciated, her head was sunk under the feed manger and she was unable to raise it, but could turn it to either side, her back was arched. Pulse 64, respiration 56, nostrils dilated. No change in the eyes. Horns normal, cervical vertebrae showed nothing wrong, the gait was staggering and when she was pricked with a pin, she showed hyperesthesia. The diagnosis was uncertain. The animal was destroyed. At post-mortem, except hyperemia, nothing abnormal was found about the brain. Evidences of tuberculosis were found in the lymph thoracic glands and small tuberculous foci in the lungs. One abscess was discovered below the sixth and seventh cervical vertebrae. It was as big as a man's fist, and probably of tuberculous nature. No bacteriological examination was made. LIAUTARD.

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—The following officers of the Veterinary Corps have been assigned as follows: Major W. G. Turner, Corozal, Canal Zone; Captain E. J. Cramer, depot quartermaster, Seattle; 1st Lieutenant J. A. McKinnon, Manila, P. I.; 1st Lieutenant K. A. Lytle, Chicago; 1st Lieutenant O. A. Barber, Fort Keogh remount depot; 1st Lieutenant S. L. Teeple, El Paso; 1st Lieutenant L. E. Case, Honolulu, Hawaii; 2nd Lieutenant J. N. Hornbaker, Front Royal, remount depot; 2nd Lieutenant S. H. Saul, Seattle; 2nd Lieutenant A. G. Fraser, El Paso; 2nd Lieutenant G. W. Brower, Manila, P. I.; 2nd Lieutenant J. W. Burby, Southern department.

—It is reported that the British army sends between 400 and 500 horses a week to Paris butchers to be slaughtered and put on sale in the horse meat markets. The French army furnishes a smaller number. The total makes an important contribution to the feeding of Paris.

—Much concern is exhibited over the high death rate of horses sent from this country to France. In some shipments the rate has been as high as 70%. The malady is as yet mystifying and is still unsolved. Opinions vary, some have suggested poisoning by enemy agents here or on ship board; others think it may be an unusually virulent form of "shipping fever", "forage poisoning", pleuro-pneumonia, etc.

—Dr. J. L. Ruble has been transferred from Fort Bliss, Texas, to Camp Robinson, Sparta, Wis.

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Alberta—M. V. Gallivan, P. O. Box 567, Lethbridge
British Columbia—J. G. Jervis, 3694 Victoria Drive, Vancouver
Manitoba—Wm. A. Hilliard, 630 McMillan Ave., Winnipeg, Man.
New Brunswick—D. McCuaig, McAdam, Jct.
Nova Scotia—Geo. Townsend, New Glasgow
Ontario—Geo. Hilton, Bureau of Animal Industry, Ottawa
Pr. Ed. Is.—W. H. Pethick, Charlottetown
Quebec—A. A. Etienne, 67 Drummond St., Montreal
Sask'wan—M. Barker, Saskatoon, Box 463

## SECRETARY'S OFFICE

1827 South Wabash Avenue, Chicago, Ill.

### ARMY SERVICE

Veterinary service in the army, other than the Regular Army, as viewed from this office seems to be in an unfortunately pitiful condition, both for the government and the veterinarians, and in spite of the fact that this association through men who have studied army veterinary service abroad during this war and others who served the army during the Spanish-American War and the Philippine revolution have volunteered to advise the government on the requirements of an efficient service, little inclination has thus far been shown toward an improvement of this service. Why we should cross the ocean to fight armies which lack nothing in organization handicapped in this or any other particular is beyond our comprehension, and those of us who have sons on the firing line may feel this shortcoming more keenly than others.

It has been shown emphatically that horses are a mighty important factor in modern warfare, despite the impression that mechanical transportation of men and supplies on the battle fields have replaced them. Besides horses are such costly commodities once trained and transported into Europe for service that any neglect to conserve them seems like willful negligence.

Our veterinary colleges in the spirit of patriotism and at the earnest solicitation of the government are bending their efforts to supply some two thousand veterinarians for immediate service and while we have no accurate information as to the number thus far obtained, we know they come largely from the graduates of 1917 selected in at least some cases with little regard for their fitness. As these men enter the service without experience either in the army or elsewhere and as they will have but little tutorage from older men who rank them there is danger that veterinary service in the United States Army will be discredited.

This association will continue to do what it considers is its greatest patriotic duty—that of giving the government the best information it has about what constitutes a proper veterinary organization for the approaching conflict. With a proper organization in which veterinarians will be given authority to utilize their knowledge and skill for the good of the service, it is evident from information falling upon our desk from day to day that many of

our best practitioners stand ready to sacrifice personal interests at once by giving their service to the nation. Today they stand back fearing they will be humiliated personally and their profession discredited.

CIRCULAR FROM PRESIDENT WILSON.—Under date of June 8th the Secretary to the President, replying to inquiries about the advisibility of foregoing conventions during the war writes: "The President asks me to say that there is no sufficient reason for foregoing conventions and general commercial meetings by business interests so far as he can see." Signed, J. P. Tumulty.

FINAL REPORT ABOUT RATES TO KANSAS CITY.—The selling dates from all points east of the Mississippi are August 17th, 18th and 19th and the last returning date is August 29th.

The selling dates from California points are August 14th and 15th and from North Pacific points August 10th, 11th, 17th and 18th. The rate from California points for the round trip is $67.50 and from North Pacific points $67.50 direct and $74.35 via St. Paul.

Southeastern and Southwestern delegates should inquire of their agents about special excursion rates promised by the passenger associations covering these territories.

PROGRAM.—It is not thought advisable to print the uncompleted program again in this issue since it is the intention to publish it in the fullest detail in the August issue. Secretary Munce of the Section on Sanitary Science and Police already reports a program for this section that leaves nothing to be desired, and promises additional contributions which should be in our hands in a few days.

Chairman Ferguson and Secretary Blattenberg of the Section on Practice and Surgery have formulated an entertainment the like of which has never been presented at an A. V. M. A. meeting for the benefit of practitioners. L. A. MERILLAT, Secretary.

## HOTEL ACCOMMODATIONS.

The Local Committee on Arrangements recommend that those who anticipate attending the meeting should engage rooms at once. This may be done by writing to the hotel direct.

Headquarters are at the Muehlebach. Five additional hotels, fire-proof and of modern equipment, are situated just across the

intersecting streets from headquarters, 12th and Baltimore. There are others near by.

The committee offers the following information concerning hotel rates:

| Hotel | Address | Hotels Available for Convention Members | | | | |
|---|---|---|---|---|---|---|
| | | With Bath | | No. of | Without Bath | |
| | | Rooms | Rate | Persons | Rooms | Rate |
| Muehlebach, 12th and Baltimore | | 20 | $4.00 | 1 or 2 | 20 | $3.00–$3.50 |
| (Headquarters) | | 100 | 5.00 | 1 or 2 | | |
| | | 30 | 6.00 | 1 or 2 | | |
| | | 20 | 7.00 | 1 or 2 | | |
| | | 10 | 10.00 | 1 or 2 | | |
| Baltimore, 12th and Baltimore | | 75 | $3.00–8.00 | 1 | 25 | $2.00–$3.00 |
| | | | 4.00–10.00 | 2 | | 3.00– 4.50 |
| Dixon, 2th and Baltimore | | 30 | 2.00–2.50 | 1 | 20 | 1.50 |
| | | | 3.00–3.50 | 2 | | 2.00 |
| Sexton, 12 West 12th St. | | 50 | 1.50–2.50 | 1 | 20 | 1.00 |
| | | | 2.50–3.50 | 2 | | 1.50 |
| Bray, 1114 Baltimore | | 40 | 1.50–2.00 | 1 | | |
| | | | 2.00–2.50 | 2 | | |
| Majestic, 1215 Baltimore | | 25 | 1.50–2.00 | 1 | 20 | 1.00 |
| | | | 2.50–3.00 | 2 | | 2.00 |
| Coates, 10th and Broadway | | 25 | 1.50–2.00 | 1 | 25 | 1.00– 1.50 |
| Savoy, 9th and Central | | | | 1 | 50 | 1.00– 2.00 |
| Washington, 12th and Wash'ton | | 30 | 1.50–2.50 | 1 | 30 | 1.00– 2.00 |
| Wyandotte, 11th and Wyandotte | | 20 | 1.50–2.00 | | | |

There are also thirty or more small hotels within a radius of five blocks of Headquarters.

## MASSACHUSETTS VETERINARY ASSOCIATION

The regular monthly meeting of the Massachusetts Veterinary Association was held at the Quincy House, Boston, February 28, 1917. The meeting was called to order by President Peirce. The records of the previous meeting were read and approved.

The president announced the appointment of the following committee to revise the constitution: Drs. Cahill, Howard, and Frothingham.

On motion, it was moved that the speaker of the evening, Dr. Charles H. Duncan of New York City, be asked to speak before the regular order of business was taken up.

Dr. Duncan gave us a most interesting talk on the subject of autotherapy, of which he is the discoverer. His opening remarks

were that the father of all vaccine therapy was a veterinarian, Lux by name. His theory was called Isothapy The following excerpts are taken from Dr. Duncan's remarks:

That the natural habit seen in most animals of licking their wounds is really practicing auto-immunization; that during the present great European War, it has been customary to have soldiers who are wounded practice the same method, namely to lick the wound if it can be reached, or if it is in such a place that this cannot be done, to pack the same with cotton or gauze and then after the removal of the packing, to chew the same, swallowing the discharge, and thus gaining an immunity. In a deep penetrating wound a drain is inserted and the discharge swallowed. In cases where the suppurative discharge is swallowed by the patient, the results are almost instantaneous and arrest suppuration. In nursing mothers, both animal and human, where arrested lactation or "drying up" is noticed, if a small amount of milk is injected hypodermically, it will act as a galactagogue, and cause profuse flow of milk.

Dr. Duncan's remarks were extremely interesting and forceful, and it was generally agreed that his address was one of the most interesting to which we have listened for some time. He was extended a rising vote of thanks.

The Secretary read House Bill 1590, which read more as a joke than anything else, and which was directed against all dogs. The association was recorded as being opposed to this bill.

The Secrteary read a letter recently received from Dr. Winchester, which quoted Dr. Liautard regarding the Belgian relief fund. Moved by Dr. Sturges, seconded by Dr. Balkam, that the Secretary send a check for $25 to Dr. Liautard.

The following applications for membership were received: Dr. H. N. Eames, Wilmington; Dr. E. C. Campbell, Boston; Dr. W. F. McNamara, Worcester.

Several members expressed opinions regarding the annual banquet.

The Secretary announced that Dr. W. Horace Hoskins of Philadelphia had been elected to the executive committee of the A. V. M. A. to represent this district.

The President called attention to the fact that there was to be a civil service examination for veterinarians for the Dept. of Animal Industry.

Dr. C. H. Playdon reported an unusually interesting case of tuberculosis in a horse, and at his request the laboratory findings were described by Dr. Cahill.

Adjourned at 7:30. E. A. CAHILL, Secretary.

May 23, 1917.

The Annual Meeting of the Massachusetts Veterinary Association was held at Young's Hotel, Boston, on April 26, 1917. The meeting was called to order by President Peirce, and the minutes of the previous meeting approved as read.

The Secretary-Treasurer distributed copies of his annual report among the members.

Dr. Howard for the Executive Committee reported that it had audited the Treasurer's account, and found the same correct. Moved by Dr. Thayer, seconded by Dr. Plaskett, that the Executive Committee's report be accepted. Carried. Moved by Dr. Plaskett, seconded by Dr. Peirce, that the Secretary-Treasurer's report be accepted. Carried.

The election of officers being the next order of business, it was moved by Dr. Winchester, seconded by Dr. Playdon, that the President appoint a nominating committee of three. Carried. The President appointed Drs. Plaskett, Playdon, and Clark.

The Secretary read a letter from Charles H. Cole, Chairman of the Committee on Land Forces, in answer to a communication from this association.

The application of Dr. R. L. Burnett of Conway was taken up for consideration. It was moved and seconded that the secretary cast one ballot electing him to membership. This was done, and Dr. Burnett elected to membership. The following applications for membership were received: Dr. Edw. J. Welsh, Fall River; Dr. Richard J. Dinsmore, Framingham; Dr. Harry H. Newcomb, Salem; Dr. Wm. F. Schroeder, Somerville.

In pursuance with the constitution, these were laid on the table for one month. The nominating committee reported the following nominations for officers for the ensuing year:

President, Dr. W. M. Simpson, Malden; First Vice President, Dr. Harry Lukes, Springfield; Second Vice President, Dr. Leon A. Paquin, Webster; Secretary-Treasurer, Dr. Edw. A. Cahill, Lowell.

It was moved by Dr. Cleaves, seconded by Dr. Thayer, that the secretary cast one ballot, electing these officers. Carried.

Dr. Winchester, after obtaining the floor, spoke on tuberculosis, and offered the following resolution:

WHEREAS, It has come to the notice of the Massachusetts Veterinary Association that Section 31, Chapter 90 of the Revised Laws, as amended by Chapter 322, Acts of 1903, is inadequate;

WHEREAS, It is recorded in Public Document No. 98 for the year 1917, and complying with the present law, 87 known cases of tuberculosis in cattle are at large;

WHEREAS, The Revised Laws, as amended, make optional with officials the use of tuberculin as a diagnostic agent;

WHEREAS, The real aim of the veterinary profession is not simply the conservation of commercial interests, but the preservation of human life, which is both economic and humanitarian; now therefore, be it

*Resolved,* That the Massachusetts Veterinary Association at its 36th Annual Meeting empowers its President to appoint a committee to revise the laws relating to the diagnosis and disposal of cattle with tuberculosis, and to make such suggestions as they deem necessary to the next General Court. Be it further

*Resolved,* That the Massachusetts Veterinary Association as a body or by representatives appear before the Legislature for the year 1918, recording the approval of such action.

Moved by Dr. Emerson, seconded by Dr. Peirce, that the resolution be referred to a committee appointed by the chair. Carried.

Moved and seconded that a rising vote of thanks be extended to the retiring president. Carried.

Following the meeting, seventy-five members and guests assembled in the banquet hall for the annual banquet. The menu proved to be of its usual high standard, and was enjoyed by all. The president announced that the toatsmaster for the evening would be Dr. Lester H. Howard. Dr. Howard offered the usual remarks as to being surprised and unprepared, etc., but it was noticed that as usual he filled the office most fittingly. The toastmaster then introduced the chief speaker of the evening, Dr. D. H. Udall of New York State Veterinary School, Cornell University, Ithaca, N. Y.

Dr. Udall's subject was tuberculosis, and proved to be a masterpiece on this subject. He dealt particularly with the eradication of tuberculosis from a dairy herd, with particular reference to physical examination, and laid particular stress on the use of the sputum cup in obtaining samples for bacteriological examination. An immense amount of statistics have been obtained by Dr. Udall on this subject, from which he quoted at considerable length. The outstanding feature of Dr. Udall's remarks was his opinion on building sanitary cow-barns, particularly with reference to the mangers. At the conclusion of Dr. Udall's remarks, he was extended a rising vote of thanks.

The remainder of the evening was taken up by a quartet of entertainers known as the "Florentine Musicians". They are professional entertainers of great ability, and entertained everybody in a most capable manner.

The meeting was adjourned at 11 P. M.

EDWARD A. CAHILL, Secretary.

## CALIFORNIA STATE VETERINARY MEDICAL ASSOCIATION.

The following program was prepared for the California State Veterinary Medical Association and its Southern auxiliary:

The Milk Goat Industry.....L. E. Chaney, Kings City
Some Hints on Ophthalmology.....J. L. Tyler, Pomona
Essentials of the Veterinary Hospital
E. C. Ziekendrath, Palo Alto
New Blackleg and Anthrax Immunizing Agents
O. A. Longley, Oakland
Service by Veterinarians During the War
Discussion opened by.....Chas. Keane, Sacramento
Human Surgical Clinic.....Chas. W. Levison, San Francisco
Visit through San Francisco Hospital

## VETERINARY MEDICAL ASSOCIATION OF NEW JERSEY.

The semi-annual meeting will be held at Asbury Park, N. J., July 12 and 13.

Among the papers to be presented will be the following:

State Veterinary Medicine
W. Horace Hoskins, Philadelphia, Pa.

Hog Cholera Control in New Jersey
Professor F. C. Minkler
Live Stock Commissioner, Dept. of Agriculture of New Jersey
Veterinary Biological Therapeutics
A. Eichhorn, Pearl River, N. Y.
Dairy Cattle and Breeding Problems
J. F. DeVine, Goshen, N. Y.

E. L. LOBLEIN, Secretary.

## FLORIDA STATE LIVE STOCK SANITARY BOARD.

Florida now has a State Live Stock Sanitary Board, created by act of the last legislature, to take over the administration of live stock sanitary matters, which heretofore have been handled by a state veterinarian and assistants working under the State Health Board. The funds for that department were limited and very little organization work was done for eradication of cattle fever ticks.

The legislature appropriated $150,000 for the ensuing two years for the State Live Stock Sanitary Board to use in eradication of ticks and control of hog cholera and other animal diseases.

It also authorized the county commissioners in each county to appropriate up to two mills per annum on the assessed valuation of property for building vats and co-operating with State and Federal Government officials in eradicating ticks.

This insures rapid progress of tick eradication work in Florida.

The State Live Stock Sanitary Board is composed of the Commissioner of Agriculture, who shall be ex-officio president of the Board; Superintendent of Instruction; State Treasurer; and two other members to be appointed by the Governor, who shall hold office for four years, or until their successors are duly appointed and qualified.

The Board members are not allowed a salary or per diem, but may receive their actual expenses incurred in discharge of their duties as members of said Board. They shall select and employ an experienced veterinarian, who will be the chief executive officer and secretary of the Board, who shall be known as State Veterinarian. He shall not be dismissed except for cause, and shall give bond in the sum of $10,000 for the faithful performance of his duty.

## CONFERENCE OF STATE AND FEDERAL VETERINARIANS.

The importance of State and Federal Government veterinarians getting acquainted with and so far as possible co-operating with practicing veterinarians when working in their local territories was emphasized at a meeting held in Jacksonville, Florida, June 1st and 2nd.

Dr. E. M. Nighbert, inspector in charge of tick eradication work in Florida for the U. S. Bureau of Animal Industry, called in all of his men for a conference. He also invited Dr. Charles F. Dawson, state veterinarian, and his assistants; Dr. E. F. Haven, inspector in charge of meat inspection in Florida for the U. S. Bureau of Animal Industry, and his assistants; and the practicing veterinarians in Jacksonville.

A number of the invited guests took part in the program and offered helpful suggestions for increasing the efficiency of the men in the field by getting acquainted with the local practicing veterinarians and showing some interest in their work.

Instances were related of work being retarded in some other states because the local men had not been advised of the program to be carried out, and had discouraged their clients when consulted as to what should be done under certain conditions.

The question box was an innovation at such conferences and furnished subjects for several hours of discussion which brought out valuable information on handling local problems in the field.

Dr. E. M. Nighbert gave a lecture on "Tick Eradication and the Effects Upon Cattle, the Result of Dipping in Standard Arsenic Solution". He emphasized the statement that some people are more affected by seeing their cattle dipped the first time, than are the cattle. The former are very nervous, while the stock swims through the dipping solution and go to grazing as soon as turned out of the drip pen. It is as necessary to handle the people carefully as it is to keep the cattle from getting excited. The results of the first dipping will convert the owners to advantages of eradicating ticks and then systematic work will come quickly.

Dr. R. E. Jackson, inspector in charge in Alabama was assigned to represent Dr. R. A. Ramsey, Chief, Tick Eradication Division, Washington, who was unable to be present, and gave a very interesting report of organization work in his state.

Dr. Nighbert and his men gave a banquet to all of the guests who attended the conference, at which President F. C. Groover of the Jacksonville Chamber of Commerce was the main speaker, although a number of brief talks were given by those present. Dr. Nighbert served as toastmaster and introduced each speaker with some humorous reference to tick eradication.

## SOUTHERN TIER VETERINARY MEDICAL ASSOCIATION.

The following program has been prepared for the meeting of the Southern Tier Veterinary Medical Association at Elmira, N. Y., July 7:

9:30 A. M.—THE CLINIC will be held at the Hospital of Dr. A. J. Battin, 456 West 1st Street, Elmira, N. Y.

AFTERNOON SESSION—Forage Poisoning—Infection or Poisoning
Dr. P. J. Axtell, Binghamton

The Stallion Registration Law — Dr. J. G. Wills, Albany

The Technique of Douching the Uterus
Dr. W. L. Williams, Ithaca

EVENING SESSION—A Discussion of Case Reports
Opened by Dr. D. H. Udall, Ithaca, N. Y.

## KEYSTONE VETERINARY MEDICAL ASSOCIATION

The regular monthly meeting of the Keystone Veterinary Medical Association was held on Tuesday evening, June 12th, 1917, at 9:00 P. M. Large attendance. The program for the evening was as follows:

The Relation of Botulinus Intoxication to Forage Poisoning
Drs. John Reichel and Malcolm J. Harkness

Report on Three Cases.....Dr. Cheston M. Hoskins

How Federal Meat Inspection is obtained and Carried On .....Dr. C. S. Rockwell

These papers were very interesting and thoroughly discussed by several members.

There was a motion made and carried to invite the A. V. M. A. to meet in Philadelphia in 1918, and the President was directed to appoint a Committee to be known as the "Boosting Committee'.

A motion was made and carried to give Dr. and Mrs. W. H. Hoskins a banquet at the Hotel Walton, Philadelphia, on Tuesday evening, June 19th, 1917 at 7 P. M., as they are leaving Philadelphia to reside in New York, Dr. Hoskins having accepted the Deanship of the New York State Veterinary College.

There being no further business the meeting adjourned at 11:45 P. M.

C. S. ROCKWELL, Sec.-Treas.

# COMMUNICATIONS

## PATRIOTIC AND PROFESSIONAL DUTY.

*Editor Journal of the American Veterinary Medical Association:*
*Ithaca, N. Y.*

It is not necessary to point out to our profession their duty at this time when our country needs us. While we have had difficulty in the past in securing legislation that would give us the professional standing that we should have, and to provide for an efficient veterinary organization for the army, now is not the time for recrimination, criticism or halting. Our country needs us and we will go whenever and wherever needed, whether it be in the ranks or in a professional capacity. We are sure the veterinarians of the United States will respond just as have the veterinarians of Canada or our professional brothers across the sea. Some of us are physically able to go wherever we may be needed most, and some for good reasons must remain at home and do the best they can under the circumstances. Many veterinarians will make great sacrifices in joining the colors. They will leave their families and the comforts of home life and in most cases also a practice that they have worked hard for years to build up. Their practice must be looked after by those who cannot go to the front. We hope and believe that every veterinarian will not only look after the practice of his brother who leaves it in response to the call of a patriotic duty, but will conserve and hold that practice for him to the very best of his ability. Let us forget the petty jealousies that competition so frequently develops and say to those who leave: "We will take care of your practice for you." The medical profession is doing this. Let us go them one better and take care of their practice and also of their families, if the need be.

N. S. MAYO.

## ARMY VETERINARY SERVICE.

*Editor Journal of the American Veterinary Medical Association,*
*Ithaca, N. Y.:*

To increase the efficiency of the mounted and transportation services it will be necessary: (a) to class all animals as public and not belonging to any particular organization, such as troop, supply troop, pack, etc.; (b) to keep the man on the fighting line as efficient as possible by supplying him with a good sound animal at all times.

This will require: (a) a Remount Corps with enlisted personnel; (b) a Veterinary Corps with enlisted personnel.

The Remount Corps should: (a) encourage breeding of the proper type; (b) buy the proper type at their own collection points; (c) build their proper depots for training, shoeing and issuing (stationary depots); (d) accompany troops sufficiently

near so as to issue sound and to take back unserviceable animals for recuperation and sale (mobile depots).

The Veterinary Corps should: (a) attend to the general welfare of all public animals, and treat the sick, etc.; (b) shoe all public animals; (c) condemn all public animals.

At present the animals are managed principally by amateurs instead of by experts and organizations devoted solely to that purpose.

A Troop Commander should not have to trouble himself about sick horses, shoeing, and condemning; he has many other things to do and also has not enough real knowledge or education on these subjects. He has to be a jack of all trades and both men and animals suffer in consequence.

The Veterinary Corps should be run with the idea of completely relieving the fighting line of all responsibility with an unserviceable animal. At present a mounted organization religiously insists on dragging its sick animals forward instead of sending them back for proper treatment and getting fresh mounts in return.

The Veterinary Corps should take complete charge of a sick animal by removing it from a troop, etc., to its own hospital or lines, and if the animal is considered to be unserviceable for some length of time a fresh animal should be issued to the troop by the Remount Depot as soon as possible. This simply requires a receipt given to the Troop Commander by the veterinarian and a receipt from the Remount Officer to the veterinarian. The animal when fit for duty can be issued to another organization. This carries out the main idea of a public animal, and keeps the fighting line in the only proper state of efficiency it should be brought up to by means of the animal question.

Horse shoers should belong to the Veterinary Corps and be assigned by them to organization, this will make for continuity of method, etc., fixes responsibility and does away with the present amateurish individualism.

Condemnation of animals also should be done by veterinarians who are experts and have their sick reports, and not by amateurs possessed in many cases with sentiment for the animal in question.

The Remount Corps should have a Colonel at the head of it and be composed of the picked horsemasters of the mounted services with a trained personnel of about one officer per 500 animals and 10 enlisted men per 100 animals.

The Veterinary Corps should have a Colonel at the head of it with a trained personnel of one veterinarian per 500 animals and three enlisted men per 100 animals, in proportion of one farrier and two horse shoers. This will give a regiment two veterinarians, twelve farriers and fifteen horseshoers or more besides supplying the Remount Corps as well.

The Remount Corps and veterinary personnel should be non-combatants in order that nothing should take away from the important duty of supplying, at all times, the fighting lines with efficient animals. This also tends to the formation of a stable and highly trained personnel instead of the present unsettled, happy-go-lucky method of a combined man and indifferent performer, the last a radical outcome owing to a low plane of education in general, which allows the mind to be easily diverted by a change of duties. The procedure of a veterinary unit attached to a regiment would be about as follows:

2 veterinarians and mounts; 12 farriers to be assigned to organizations; 15 horse shoers to be assigned to organizations; 24 horses; 1 wagon; 4 mules; 2 officers' tents (1 for officer and 1 for medicine, etc.); 4 tarpaulins (18x30) or (20x40); 4 pyramid tents; 16 poles (half 8 ft.) and (half 10 ft.); sufficient rope to put up paulins and picket line; medicines and equipment; food for men and animals.

The personnel to affiliate with the Medical Corps Detachment and all mess together if possible. At the end of March the four tarpaulins to be put up in prolongation making a covered shelter 66 feet long and 20 feet wide with picket line through the centre. Then men are assigned to troops to collect all sick animals at the hospital where they are treated and made as comfortable as possible.

Any seriously sick animals are sent back next day to the base or division hospitals, etc., and Remount Corps notified to send forward a like number of fresh animals. Mild cases to be led next day by farriers and horseshoers. Hopeless cases to be promptly destroyed. Cases temporarily unserviceable to be taken back by Remount Corps for reissue.

If a squadron is detached from its regiment and veterinarians and several farriers can accompany it with a paulin and sufficient equipment and one wagon could be used for both the Medical Corps and the Veterinary Detachment. It will be contended that the overhead charges for these organizations will be large, possibly so, but the increased efficiency of the fighting line will more than compensate besides a counter balance in the fact that animals will render longer life of service than the present low average. Also as both the Remount Corps and Veterinary Corps would have to render daily and monthly returns in regard to the breed, qualifications, sickness, treatment, service and death of the animals; these reports could be consolidated into one statistical report each year so that one could see how many animals in each troop and regiment suffered from unpreventable diseases; how many young remounts died before their time or proved unserviceable and from what causes, etc., what breeds of animals stood the work; what forms of treatment were more successful; where the best types of

animals were bred. With these reports, in a few years' time we would have most valuable and practical information for the army at large to read, whereas at present not even a troop commander knows how many sick horses he has had in a year and a Colonel of a regiment does not even know about the sick or remount records of his regiment or of any other regiment. How then, can any real information be gained under such conditions?

For instance an Infantry Inspector General will come around and condemn the animals of a regiment and he has to trust to somebody for his knowledge. Then a number of remounts are sent to fill up; they may come at any time and in any quantity; sometimes they come just before target practice or during marches and manoeuvre periods, consequently they may be taken along or neglected till the winter season starts; both methods are bad.

Primarily the most important objective will be the breeding of a proper type of animal, especially of horses.

Owing to the enormous buying of the European nations during the last three years this country has been depleted of good light horses for army purposes, also owing to the present contract system of buying employed by the War Department the farmers have largely stopped breeding an army horse on account of low purchase price. Consequently it should be strongly brought to the attention of the Government that large premiums should be given in each state for the best remount sizes, dams and progeny. It should be the business of the Remount Corps to judge on these premiums and otherwise get in touch with the breeder for the purpose of encouraging the breeding of a good type of horse.

Then the Remount Corps can have a settled policy in regard to type, remount stations, handling, training and issuing to troops. This can only be properly done by close affiliation with a Veterinary Corps with an enlisted personnel for each organization.

The present system of buying is a poor one in that it is merely a question of individuals and opportunism, this leads to great varieties in types of animals bought to the manifest detriment of the mounted services. Then animals are bought in centers of infection and arrive at their ultimate destination so sick as to be useless for work for several months, also at the receiving depots, no proper arrangements are made to keep the animals in condition or gentle the unbroken ones, thus neglecting the main idea of supplying the front line with a serviceable animal fit to go to work immediately. In fact troops have to suffer depletion in order to send back men to bring weak and ailing horses from the Remount bases to the fighting line, and many of these animals die en route.

Remount depots should be so constructed and organized that every well animal gets at least ten miles around a track every day and convalescent animals proportionally as to their condition. All these animals should be properly shod, and broken to be shod quietly before they join troops, but it is a common sight to see ani-

mals with shoes buried in the substance of the hoof and others with feet six or seven or eight inches long.

An animal that has wandered around a corral for several months with long and untrimmed feet is useless on the fighting line, it will take two or three months to get him in shape to be really serviceable. With a Remount Corps and Veterinary Corps made responsible, these conditions would not exist, if they did, then the blame can be promptly attached and the faults remedied.

Let the army animal be served by experts devoted to that purpose and trained especially along systematic and well established lines.

Let them be public animals and not parts of a small unit controlled by several masters; the old adage that "too many cooks spoil the broth" is very suitable. R. VANS AGNEW.

# REVIEW

## THE MICROSCOPE. AN INTRODUCTION TO MICROSCOPIC METHODS AND TO HISTOLOGY

SIMON HENRY GAGE,

Professor of Histology and Embyrology, Emeritus, in Cornell University

Twelfth Edition. Rewritten and illustrated by over 250 Text Figures
The Comstock Publishing Co., Ithaca, N. Y. 1917.

It is a statement universally true, that the better a skilled workman knows his tools, the better work can he accomplish with them. This particularly applies to that delicate and intricate instrument, the microscope. For many years the only satisfactory book in the English language for general use has been the one whose twelfth edition has now appeared. The author has in each succeeding edition most painstakingly brought it abreast of the times and made it thoroughly up to date. This is preeminently true of the present edition which has been extensively rewritten, thoroughly revised and enlarged by one-third over the edition that preceded it. The chapters are increased from ten to twelve and many of the earlier figures have been replaced with new ones.

For all users of the microscope in biological work, whether they be students or investigators in the field of veterinary and human medicine, zoology, or botany, Gage's "The Microscope" will continue to be, and in still greater degree, a book of great

value which should be always available for general use or consultation.

The Microscope, its theory, principles and structure; its use and application; together with chapters on magnification and micrometry, drawing with the microscope; the projection microscope; photography with the microscope; the spectroscope and polariscope; and two chapters on mounting and storing microscopic preparations; fixing, imbedding, sectioning, staining; the preparation of serial sections and the preparation of models of microscopic objects, are the topics fully and clearly presented. The last chapter (XII) is new, on the history of lenses and the microscope.

The students and graduates of veterinary medicine have a peculiar interest in this book as its growth has been intimately connected with veterinary teaching. This particularly applies to those of the New York State College of Veterinary Medicine at Cornell University, whose students for ten years enjoyed the personal guidance of the author whose clarity as a teacher we find embodied in this book. Former students of Professor Gage will welcome this last crystallization of his clear teaching; and to those who have not enjoyed his personal instruction, this volume is heartily recommended as a substitute and a guide.

B. F. KINGSBURY.

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—Dr. W. H. Lynch, of the Portland Veterinary Hospital, Portland, Maine, has been appointed member of the Maine State Veterinary Examining Board by Governor Millikin. This is Dr. Lynch's third consecutive term on the Board of which he has been Secretary since very shortly after his first appointment. This Board met for reorganization in May at which time Dr. Lynch was again elected Secretary of the Board. Dr. I. L. Salley of Skowhegan was elected President.

Dr. Lynch will be glad to communicate with any veterinarian who may contemplate coming into Maine to practice veterinary medicine.

—The New York State Veterinary Medical Society, upon a postal vote of its members, has decided not to hold the annual meeting, July 25, at Brooklyn, N. Y.

# NECROLOGY

## HARRY H. BEAR.

Dr. Harry H. Bear graduated from the New York American Veterinary College, Class of 1893. He was born at Mt. Joy, Pa., November 7, 1870, and died February 27, 1917. from diabetes. He practiced at Mt. Joy since the time of his graduation, had many friends and was much respected by those who knew him. Dr. Bear is survived by a wife, two sons and three daughters.

## LAURENCE L. PEIRCE.

Dr. Laurence L. Peirce of Arlington, Mass., died on April 28, 1917, of Bright's disease. He was forty-two years of age, and was a resident of Arlington all his life. Dr. Peirce was one of the most respected veterinarians in the State of Massachusetts, and has enjoyed an extremely large clientele ever since his graduation from the School of Veterinary Medicine at Harvard University in 1898. He was a member of the A. V. M. A., one of the most active members of the Massachusetts Veterinary Association, and a Mason. He had for years been Chairman of the Arlington Board of Health, and his efficient work in this respect both as an executive officer and in the results of the work of his laboratory had obtained for him state-wide recognition. He was also inspector of animals and milk. His funeral was largely attended by the people of his own city, and it was a noticeable fact that at the time of his funeral the flags on all municipal buildings were at half mast, and practically all the business houses of the city were closed. The respect in which he was held was manifested by the large attendance and by a wealth of floral offerings such as is seldom seen. Representative officers from the entire state were present at the funeral.

## J. J. PINK

Dr. J. J. Pink of Oconomowoc, Wis., died of pneumonia February 6, 1917, after an illness of five days.

## JAMES G. HOPE.

Dr. James G. Hope, veterinary inspector in the Bureau of Animal Industry, stationed at Union Stock Yards, Chicago, Illinois,

died June 13, 1917. Born in Syracuse, New York, in 1863, he graduated from the Chicago Veterinary College in 1896, and took a post graduate course at the American Veterinary College, New York, from which he was graduated in 1897. He was appointed a Bureau inspector through civil-service examination March 4, 1898, and assigned to duty at Chicago, Illinois. He has been in charge of federal meat inspection at Fort Madison, Iowa, Austin, Minnesota, and Fort Wayne, Indiana, and was assigned to duty at Chicago, January 5, 1914, where he resided until the date of his death.

## MISCELLANEOUS

—What We Fight For. The right is more precious than peace, and we fight for the things we have always carried nearest our hearts—for Democracy, for the right of those who submit to authority to have a voice in their own Government, for the rights and liberties of small nations, for a universal dominion of right by such a concert of free peoples as shall bring peace and safety to all nations and make the world itself at last free.—President Wilson.

—At a conference of veterinarians called by Commissioner of Agriculture, C. S. Wilson, at Albany, N. Y., May 18, to consider questions pertaining to the conservation of domesticated animals in the State of New York, the following resolution was passed unanimously:

Whereas, The recently collected statistics show that there is a great decrease in the number of calves, pigs, and poultry that are being raised in this state, and which tends to an alarming situation respecting animal food and meat food products; and

Whereas, Practicing veterinarians are in position to give valuable advice and assistance to animal owners relative to the care and protection of cattle, swine, and poultry that will tend to an increase in the number of these animals; therefore, be it

*Resolved*, That this conference of veterinarians, called by the Commissioner of Agriculture, recommend and appeal to the practicing veterinarians of the state that they take a more active part in the educational problems pertaining to the raising and conservation of food producing animals and stimulate a deeper interest in the increase of live stock on the farms of the state.

—The Minnesota and Wisconsin Veterinary Associations will hold their summer meeting at Lake City, Minn., July 11, 12 and 13. The Commericial Club and the Ladies' Club of the city are making great plans for the entertainment of the visitors. Ladies are especially invited.

—The Lobeck bill, introduced in the House of Representatives April 13, 1917, is now pending in the House Committee of Agriculture. The bill contains the same provisions for salaries for veterinary inspectors and lay inspectors as were contained in the same bill in the 64th Congress.

—Dr. F. H. Thompson has been transferred from National Stock Yards, Ill., to 326 Federal Building, Salt Lake City, Utah.

—Dr. Walter Fraser has been transferred from El Paso, Texas, to Fort Riley, Kans.

—Dr. R. H. Bussewitz has removed from Watertown to Milton Jct. Wis.

—Dr. Hugh L. Dixon has removed from Regina to Govenlock, Sask.

—Dr. L. C. Pelton has been appointed Inspector in the Dairy & Livestock Department of the State of Washington. He has removed from Enumclaw to Seattle on account of his new duties.

—Dr. A. D. Hubbell has removed from Los Angeles to Rialto, Calif.

—Dr. John Patterson has removed from Manhattan, Kans., to Hedrick, Iowa.

—Dr. G. H. Mydland has removed from Everest to Horton, Canada.

—Doctors John R. Mohler and A. Eichhorn acted as Board of Experts for the discussion of a thesis submitted by Alfred Blumberg, M.Ph., a candidate for the degree of Doctor of Philosophy at a recent examination at George Washington University. The subject of the thesis was "Studies in Immunity with Special Reference to Complement Fixation".

—Dr. F. Gunster has removed from Corvallis to Heppner, Oregon.

—Dr. Guy M. Parrish of Tampa, Fla., a graduate of the Alabama Polytechnic Institute College of Veterinary Science, has accepted an appointment in the French army and has gone to France.

—Dr. A. F. Baldwin, formerly at Creston, Ia., has removed to Rosebud, Montana.

—Do your bit for the Red Cross—also the Blue Cross.

—Dr. A. M. Wright has removed from Emmetsburg, Ia. to Spencer, Ia.

—Dr. T. W. Watson has removed from Kerens to Corsicanna, Texas.

—Dr. Dwight L. Cecil has removed from Windsor to Seymour, Ill.

—Dr. P. E. Johnson, formerly of Dayton, Iowa, is engaged in state work with headquarters at Pierre, South Dakota.

—Dr. A. F. Nelson, formerly of Indianapolis, has removed to Lebanon, Ind., for the practice of his profession.

—Dr. Adam A. Husman has removed from Cincinnati, Ohio to Chicago, Ill.

—Dr. C. V. Noback, formerly located at Otisville, N. Y., has removed to the Bronx, New York City.

—Dr. C. P. Fitch has severed his connection with the N. Y. State Veterinary College at Ithaca to accept the position of Professor of Comparative Pathology and Bacteriology and Chairman of the Veterinary Division in the Animal Industry Group, College of Agriculture, at the University of Minnesota.

Dr. Fitch has established for himself a noteworthy success as a teacher and investigator along pathological and bacteriological lines. He has capably filled the office of Secretary to the N. Y. State Veterinary Medical Society and the Southern Tier Veterinary Medical Association and his loss to the profession in the east will be much regretted.

—Examinations for the regular army veterinary service will be held July 2.

—Attention Ohio. All members of the Ohio State Veterinary Medical Association contemplating attending the meeting in Kansas City are requested to write C. H. Case, Akron, Ohio, 50 E. Buchtel Ave., at once. Very important.

CHARLES E. COTTON

President of the American Veterinary Medical Association

1916-1917

# JOURNAL
OF THE
# American Veterinary Medical Association
**Formerly American Veterinary Review**
(Original Official Organ U. S. Vet. Med. Ass'n)

**PIERRE A. FISH, Editor** **ITHACA, N. Y.**



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VOL. LI., N. S. VOL. IV. AUGUST, 1917. NO. 5.

**Communications relating to membership and matters pertaining to the American Veterinary Medical Association itself should be addressed to Secretary L. A. Merillat, 1827 S. Wabash Ave., Chicago, Ill. Matters pertaining to the Journal should be sent to Ithaca, N. Y.**


## NORMALITY

We are about to suffer hemorrhages on the field of battle. There will be a disturbance of our general functions because war is abnormal. The alternative of war or dishonor was thrust upon us and there could be but one answer. War, at best, is frightful but when frightfulness is cultivated and encouraged the iron strikes to the inmost recesses of the soul. Against the eternal rock of justice frightfulness must expend its force in vain.

Some lines of business will become hypertrophied, others will become incoordinated and undergo more or less paresis. Business will not be as usual but there will be business. Some lines of busineli will progress, others will recede. Serious emergencies cause various reactions. Some react to them hysterically while others maintain their sanity. Hysterics renders confusion worse confounded. Sanity maintains the equilibrium. The inference is obvious. Not only is it a duty but a necessity to keep things moving, to keep sweet and draw upon the reserve of optimism until adjustments can be made. Thrift must be encouraged; waste must be condemned. We are not going to starve, go unclothed nor lose this war. We must "save the waste to win the war". We are at

the training table. We can dispense with unnecessaries in order to win the race. Parsimony has not won for this nation its high place in science, commerce, power or ideals. Let us cultivate vision. Our ideals may be realized by exercising self control. Our habits of thought must change from a local and narrow environment to a vision of the world-wide demands that have come upon us to uphold the principles of democracy and all that we hold dear and to safeguard the future for ourselves and our descendants.

As a result of our disturbed metabolism, some of our scientific and other societies have deemed it advisable "on account of the war" to either cancel or postpone meetings which had been planned. Modern warfare is not altogether a matter of prowess at arms but a stupendous utilization of the various activities that contribute to the life of a nation. Since this coordination is intimate, it is difficult to understand why the various organizations should not hold their meetings. It is not likely that they could escape some reference or consideration of the war, each in its particular field. Individual action is praiseworthy; but concerted or collective action tends to a much greater degree of efficiency. The national government has in no way shown any disposition to discourage such meetings. Other governments have encouraged them. Meetings of scientific societies have always served as a great stimulus to their members and have been a "clearing house" for many of the best thoughts and ideas of our professional men. Just that is needed in our present situation. If a large business corporation depends upon the organized effort and efficiency of the several units and departments, so should our government, now more than ever, look to the collective effort of the various organizations to render suggestions and assistance in solving some of the problems that confront it.

The American Veterinary Medical Association may well be included among such organizations. Veterinarians have duties to perform not merely in the martial field and in the inspection of supplies, but in the broader area of the conservation of the health of our live stock and to assist in providing an abundant supply as needed. Some of the problems, national in scope, have wisely been featured for discussion at the forthcoming meeting in Kansas City. Past meetings have served as a stimulus for much good. The coming meeting should stimulate to greater good and greater effort. Patriotic sentiment alone should augment the attendance. Since

individual effort is weak as compared with organized effort, unattached veterinarians should hasten to join the association and add their weight in the push for greater and more effective results than have hitherto been obtained. To achieve the best we must give the best.

"Then give to the world the best you have
And the best will come back to you."

P. A. F.

## EUROPEAN CHRONICLES

POLYVALENT SERUM—The importance of this therapeutic agent is acknowledged by all. As remarked by Leclainche and Vallee in their communication on the specific seral treatment of wounds and their consecutive infections, "the controversies, which have been going on for half a century on antisepsis and its various methods, show the importance of an always open question and the uncertainty of the solutions proposed." Indeed the well known objections to antiseptics and the abuses by which reactions occurred and promoted their proscription, have stimulated research in the great series of microbicide agents, from substances which would kill the microbe while respecting the organic cell or at least without injuring it.

A specific treatment of wounds then presented itself. In the actual stage of our knowledge, two methods of interference are in vogue: vaccination and serotherapy. "The first has difficulties of realization and of uncertainty in its application, it promotes more or less severe organic reaction and its action is but limited. On the contrary, serotherapy carries with itself, already elaborated, the immunizing substances; its immunity is absolute and its effects, immediate."

The general principle of serotherapy is known. The introduction in an organism of certain "bodies" microbes or toxins for instance, gives rise to a vital reaction, which promotes the formation of other substances (antibodies) able to influence *in vitro* and neutralize *in vivo* the elements which have promoted their elaboration.

The serum brings to the treated animals the antibodies which will permit them to resist the microbes and their toxins. This protection takes place through the medium of the organic cells

which seize and digest the microbes and remain indifferent to the toxins. (*Phagocytosis.*)

Applied to the treatment of wounds and the prevention of their complications, serotherapy must have in view not one pathogenic agent but a series of microbes. It must be polyvalent, its many values correspond to the various agents that may be possible in an infection.

It is then that polyvalent serotherapy is specific. It gives perfect results only when used against the infections corresponding to its various values.

Such is the polyvalent serum of Leclainche and Vallee. Prepared by the immunization of horses against the pyogenic microbes, most frequently observed, it is in principle reserved for the treatment of local or general accidents produced by *streptococci, staphylococci, septic vibrio,* and *Bacillus perfringens* which are utilized in its preparation.

In the treatment of lesions due to other pathogenic agents, (ulcerous or epizootic lymphangitis, necrotic accidents, connected with the evolution of the bacillus of Bang, suppuration of strangles, etc.) the polyvalent serum of Leclainche and Vallee acts only indirectly in proportion to its physiological qualities and its specific action upon the pyogenic elements associated with the specific forms. Its action, still existing, is however less complete than in the other cases.

Referring to this serum, the authors continue in the *Revue Generale* as follows: "The success of the medication depends also, and in all circumstances, on the method of application. The essential conditions of the technic of the seral dressing are important.

The use of the serum is exclusive of that of antiseptics, which, besides the coagulating and neutralizing action produced by some of them, have the objection, nearly always, of depressing and paralyzing organic cells, an action essentially antagonistic to that which is demanded of the serum.

Deposited on the surface of an aseptic wound the serum constitutes an ideal dressing, identical with its physical and chemical properties to the exudation of plasma and it constitutes an efficacious protection against threatening invasions. Applied on an infected wound, it manifests its specific properties in promoting a series of phenomena more or less apparent, which indicate the activity of the cellular defense.

Injected under the skin, in threatening infections or one already invading, it promotes the lowering of the temperature and an improvement in the general condition.

The use of the serum demands its contact with the anatomic elements, hence the necessity to free the wound of the various elements which cover it. Careful washing with boiled water, preferably a normal salt solution at 9 p 1000, is desirable. With this, the action of the serum will be realized. The region should be constantly kept, by excision or curettage, in the most favorable condition for the local action, in contact with the serum. Its cicatrizing properties permit of the most extensive surgical action.

If used under these directions the polyvalent serum will give excellent results as have already been confirmed and recorded by many reports. These are found in human and veterinary journals where many cases are published and from which I will present a few instances in a later article.

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VETERINARY PRESS—Is it not surprising how many of our confreres are careless or indifferent to the organs of their profession, at least generally speaking? Is it not also astonishing that the history of the press, essentially veterinary, is neglected? One knows that such a paper is produced monthly, that another is offered to the public weekly, that a Review, general or partial, is issued at various times, but that is all. Of course, from the point of view of the daily practitioner that is all that is necessary to know; but would it not also be advantageous to know when, where and what are the publications which refer to our practice, and where they are to be found, looked into and, so to speak, dissected for the numerous interesting items of information they contain?

A general history of the veterinary press would be almost one of the entire profession down to our day. Who will write it? Who will follow the example already started by Major General F. Smith, C.B., C.M.G., F.R.C.V.S., who in the *Journal of Comparative Pathology and Therapeutics* has presented in several numbers of this excellent journal his brilliant article on *The Early History of Veterinary Literature and Its British Development?* Such a work makes a handsome addition to the literature of veterinary medicine.

These remarks were suggested to my mind by the article of

Major General Smith as well as by an editorial of the *Veterinary Journal* of February, 1917, where a history is given of that publication from its birth to the present time.

The *Journal*, if I am not mistaken, is the oldest existing periodical in England. Those who, like me, remember the *Veterinarian* and its long life will always remember it as a souvenir of its welcome monthly appearance. It died. Its long life history would be pleasant to look into. In age the *Veterinary Journal* has taken its place; but the *News*, the *Record* have begun also to add some years to their age and here is a new comer, the *Review*.

England can furnish a good chapter to the history of the veterinary press of the whole world.

Am I to speak of what is published in France, where the *Recueil* alone numbers its present volume in the 93rd year (XCIII)?

What can be said of Italy with her numerous journals on veterinary medicine, of Russia, Spain, Belgium, Germany, in fact of every country of Europe where our profession is a science as well as an art?

And again the United States. This country perhaps has been the last coming into the field and yet it can offer a big share as a contribution to our professional press.

I may be starting a nonsensical idea, but I only regret that age and a peculiar condition of health and life will not permit me to undertake the work.

At any rate the article of the *Veterinary Journal* to which I have alluded is, I consider, a beginning in the right direction and I have no hesitancy in extracting from it for the curiosity and satisfaction of our readers.

The article is presented as an introduction to the 500th number of the *Journal*. It says: "The *Veterinary Journal* first made its appearance in 1875, under the editorship of George Fleming, C.B., LL.D., F.R.C.V.S., who became Principal Veterinary Surgeon of the British army with the rank of General. On his death in 1894 he was succeeded by William Williams, F.R.C.V.S., F.R.S.E., Principal of the Royal Veterinary College of Edinborough. In 1900 Prof. Owen Williams, F.R.C.V.S., F.R.S.E., became subeditor and assumed the whole editorial responsibility when his father died. He subsequently moved to Liverpool and took an important share in founding the veterinary department of the University. In 1903 Colonel J. A. Nunn, C.B., D.S.O., F.R.C.V.S., F.R.S.E.,

joined him as sub-editor. When Owen Williams died in 1905, he was succeeded by Frederick Hobday, F.R.C.V.S., F.R.S.E., who still edits the *Journal*. On the death of Colonel Nunn in 1908, Prof. G. H. Wooldridge, F.R.C.V.S., was appointed sub-editor and remained in that post for several years. In September 1906 Doctor W. L. Williams of the New York State Veterinary College joined the editorial staff as editor for the United States. In 1910 Mr. J. A. Gilruth, M.R.C.V.S., F.R.S.E., became editor for Australia.

In 1912 Prof. Woodruff succeeded Prof. Gilruth, resigned. In 1913 Prof. Wooldridge resigned and since then Professor Hobday has had the sole charge of the editorship of the *Journal* and while he is at the front during the war he is assisted by Mr. Gladstone Mayall, M.R.C.V.S.

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THE HISTORY OF MALLEIN. The *Veterinary Record* has a leading article on the subject, referring to what could be written for England. The facts alluded to are full of interest, concise as they are, and yet one is struck by the necessity of governmental recognition in a question of that importance. This recognition was very late coming to England and one can, with the writer of the article, ask what would have happened and what amount of money would have been lost, had the mallein test been ignored by Great Britain.

Although the official introduction of mallein, by governmental order in England, was difficult to obtain, notwithstanding the great effort made by some of her veterinarians prominent in the profession, it must be remembered that this was not a privilege of that country.

Mallein met with obstacles and restrictions in Central Europe also and it took some time after its discovery in Russia in 1891, before it reached other parts of Europe. Its superior qualities were disputed and even by some whose high qualifications ought to have made them wiser and better judges.

However, by the work of many, this state of affairs has changed and there no longer exists any doubt relative to the essential necessity of submitting solipeds to the mallein test when looking for or guarding against the possibilities of a latent form of glanders.

The extensive recorded tests made by Drouin in Greece and in France and those of Hobday of England have proved the intradermo-palpebral method, an operation so certain and of such simplicity that the number of unbelievers has, I dare say, completely

subsided. If the history of mallein is ever written, I imagine that no one would ever dare to say that once he doubted its useful qualities.

According to an editorial of the *Record*, we find it recalled that it was through Sir John M'Fadyean that in 1892 the mallein test received, in England, its first introduction, when this gentleman was appointed to the staff of Camden Town. From that moment London practitioners joined in the movement and recognized the value of the new agent. Yet official governmental recognition did not support the great results obtained, and it was not until 1907 that the government recognized the test and issued the general orders on glanders.

There is no doubt that the history of glanders, previous to and since the introduction of the mallein test would prove most interesting and that a valuable document could be produced. When one considers that by mallein, the veterinary profession has in its hands one of the strongest means of controlling glanders and considering the grand success that has been obtained in the present time of war, so favorable to the spreading of the disease, it seems impossible to admit that the day will not soon come when glanders, like a few other contagious diseases, will be one of the past.

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CHLORAMINE. Based upon their experience in many cases, Drs. Desplas and Policard have called the attention of surgeons to the use of this valuable antiseptic with which they have obtained excellent results. In an article in the *Presse Medicale* they have presented their reasons.

The action of hypochlorites in an infected wound includes two processes: 1st, fixation of the hypochlorite upon the albuminoid elements and formation of a new body, a chloramine, a kind of organic hypochlorite; 2nd, the chloramine thus formed possesses a strong antiseptic action, well studied by Dakin and Cohen.

When an hypochlorite is made to act on a wound, it is partly by the chloramine that the bactericidal action takes place.

Therefore to avoid the dissolution of the tissues of a wound it is extremely advantageous to utilize not the hypochlorites, but the chloramine which has no dissolving action.

On this rests the indication for the clinical use of chloramine. The *paratoluene sodium sulfochloramine*, which was discovered by Chattaway and is generally known *simply* as *chloramine* is a white

powder formed of little plates, having an odor of chlorine gas, easily dissolved in cold sterilized water, and can be mixed with any fatty substance. In solution of 1.5% in sterilized water, it shows a much greater antiseptic power than any hypochlorite and has a much less irritating action. Stronger solutions, however, irritate the integument considerably.

Such a solution has no dissolving action on the muscular or aponeurotic tissues and, while under treatment, these preserve their anatomical appearance for four or five days, until granulations are formed.

The solution is used in two ways: for flat superficial wounds a moist dressing is employed, first covered with sterilized gauze, this is sprinkled with the solution of chloramine and the dressing is completed with a sponge-cloth or hydrophile or ordinary compress. The dressing is renewed every 24 hours at first, then 48 hours after the third day.

For deep wounds the solution is used in instillations every three hours. For very superficial wounds an ointment is used.

Chloramine has no dissolving action on the tissues. This is an essential character but it has its advantages and its inconveniences. When there is no necrotic process going on, its sterilization takes place very rapidly and the secondary repair goes on after six or seven days. If on the contrary the necrotic process is extensive, the chloramine jugulates the infection but the myolysis takes place by autolysis, which is a slow process. It is necessary to resort to the mechanical excision of the necrosed tissues.

Fresh wounds treated primarily with chloramine *do not suppurate.* In old suppurating wounds, in three or four days, the suppuration stops or is reduced rapidly, and providing all foreign bodies have been removed, the granulating process takes place also very rapidly. The granulations which were at first pale, infiltrated and bleeding easily, soon become of a good character and progress towards cicatrization.

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Alcohol for Cleaning the Hands. Is alcohol a superior agent for the washing of the hands of a surgeon preparatory to an operation?

On this question an interesting controversy has been started and articles have found their way in the medical papers. The

critics differ and refute justification of the use of alcohol for the disinfection of the surgeon's hands. Among many the following has appeared in the *Presse Medicale* relating to some points of importance claimed for it as making it an efficacious, simple and rapid mode of disinfection.

Is alcohol the most efficacious among the antiseptics and microbicides for the asepsis of the skin? For many the ideal antiseptic is yet to be found. Successively a great number of substances have been proposed and among them alcohol; but the microbicide properties of that substance and its manifest superiority have to be established. It has been said that alcohol at 100° has a bactericidal and antiseptic power more developed than alcohol at 90°. To oppose that statement it may be remarked that it is generally admitted that alcohol at a degree inferior to 90 was more microbicidal. It is a known fact that diluted alcohol is more extensively used by surgeons in our day. More than that, it is already in disuse by many who prefer to resort only to alkaline solutions in preference to any alcoholic preparation.

As to the simplicity of its use, it does not seem to be superior to the method where other antiseptic preparations can be resorted to in preference to a costly liquid and which is not without danger.

As to the rapidity of the disinfection to be obtained, it is a question which can only be realized if alcohol is the most efficacious antiseptic and microbicidal agent, which is to be demonstrated.

While waiting for more complete and comparative experiments, alcohol cannot be considered as possessing any qualities superior to other antiseptics for the disinfection of the hands of surgeons and that no one would abandon soap and water for it. Certainly surgeons who use rubber gloves will not discard them for an alcoholic scrubbing.

Bibliography. In the April number of the *Journal*, our worthy editor and friend Dr. Fish has already announced the arrival of a new monthly in England, the *Review*, published by the Principal of the Royal Veterinary College (Dick).

I am sure a word on it in the European chronicle is in order.

I have seen only the second, the May, number and a careful examination tells what the *Review* intends to be and what the volume will accomplish at the end of the year.

This number has first an article on *Specific Polyarthritis* by William Brown, M.R.C.V.S. Then come the abstracts. These form

the *Review*. They are divided into chapters, anatomy, dietetics, general, historical, hygiene and preventive medicine, infectious diseases, medicine, methods, parasitology, pathology and bacteriology, poultry diseases, serology and immunology, surgery, teratology, toxicology, tuberculosis.

After the abstracts comes the chapter of reports followed by the reviews and notes on books.

The number closes with a bibliographic list of many papers on almost all the subjects considered in the chapters.

A somewhat similar work was inaugurated several years ago in France by the well known publication of Leclainche and Panisset. It met with success and it is certain that the new *Review* will obtain one equally great. If, as I hope it will, the *Review* extends its work among the publications, which are temporarily arrested on account of the war, then our friends who are English readers will certainly find the work of Dr. Bradley one of the most valuable additions to our literature.

## SUMMARY FROM RECENT PUBLICATIONS RECEIVED AND BIBLIOGRAPHIC ITEMS*

JOURNAL OF COMPARATIVE PATHOLOGY AND THERAPEUTICS.—(March) Early history of veterinary literature and its British development (continued). On a tick-borne gastro-enteritis of sheep and goats in British East Africa. Tuberculous mastitis in cows—pathogenesis, morbid anatomy and histology. Sarcoptic mange in the ox. Tuberculosis in camels.

VETERINARY JOURNAL. (April). Glanders and the British army. Early history of the veterinary profession in Victoria. (O) Case of splenic abscess due to Spiroptera Megastoma. (O) Caesarian section in a Brahman heifer.

VETERINARY JOURNAL (May). Remarks on the surgical treatment of quittor. Graphic method of recording lameness. (O) Interesting case in a foal. (O) Canine, feline and porcine cases.

VETERINARY NEWS. (O) Paralysis of anterior crural and radial nerves. Canker of the foot and its treatment. Points on pig practice. (X) Presence of tubercle bacilli in the fèces of cattle in dairy herds.

VETERINARY RECORD (April). (O) Interesting case of fracture of the os coronae. Treatment of respiratory diseases by intra-tracheal injections of formalin. Surgical conditions encountered in canine practice. Equine sarcoptic scabies in the mouse. (O) Anomaly of a valve in the heart of a horse.

BULLETIN DE LA SOCIETE CENTRALE. On the treatment of distomatosis. Symptomatology of epizootic lymphangitis. (X) Treatment of wounds with polyvalent serum. (O)Observations cliniques. (O) Severe traumatism of the neck.

REVUE GENERALE DE MEDECINE VETERINAIRE. (X) Notes on the operation of Williams. On the treatment of tetanus.

REVUE DE PATHOLOGIE COMPARATIVE. On artificial emunctories.

CLINICA VETERINARIA (April). Rabies and hemorrhagic septicemia in cattle. Intratracheal injections of alcoholic creosote in the treatment of pneumonia of horses.

IL NUOVO ERCOLANI. Glucosed serum in intratracheal injections in over worked horses.

BULLETIN 85—*University of Nevada.* The use of bacterin in the control of fowl cholera. A. LIAUTARD.

*Titles marked "X" will be summarized. Those marked "O" will appear as abstracts.

—FRANCO-BELGIAN VETERINARY RELIEF FUND. The Southern Tier Veterinary Medical Association, at its last meeting in Elmira, N. Y., appropriated fifty dollars for this fund.

—A valuable bulletin by Doctors Dalrymple and Flower has recently been issued by the Louisiana State Live Stock Sanitary Board. It is entitled "Thirty-eight Questions and Answers Concerning Charbon or Anthrax."

—The fourth annual convention of the National Association of the Bureau of Animal Industry Employees will be held at Omaha, Neb., in the Hotel Rome, Monday, August 13. The Omaha branch is making elaborate arrangements for the entertainment of the delegates.

—A meeting of the Association of State and Provincial Veterinary Colleges is scheduled to be held at Kansas City, Mo., August 19th, the day preceding the opening of the meeting of the A. V. M. A.

—The members of the Kentucky Veterinary Medical Association were entertained by Doctors M. A. Purdy and J. K. Ditto with a very elaborate banquet at the meeting held June 20 and 21.

—It is reported that the flesh of goats, horses and mules have been added to the meats that may be sold for foods in Pennsylvania.

—First Lieutenant Dr. D. B. Leininger, formerly stationed at Douglas, Arizona, is now located at Fort Bliss, Texas.

—The next meeting of the Colorado Veterinary Medical Association is scheduled for January, 1918.

# THE ETIOLOGY OF HOG CHOLERA

(SECOND REPORT)

FREDERICK PROESCHER, M.D., AND HARVEY A. SEIL, Ph.D.
Pittsburgh, Pa.

In a previous paper in this *Journal* we described a small coccus found in the blood and urine of pigs affected with hog cholera. This organism was made visible both substantively and adjectively with methylene azure carbonate. It was found in the desquamated endothelial cells circulating in the blood stream, in the leucocytes and also attached to the red cells as well as extracellular. The minute size, staining properties and localization of these microorganisms pointed to them as the probable causative agents of hog cholera. The organisms are differentiated from mitochondria which exhibit the same staining properties and in the granular form closely resembles them by their uniform size and peculiar affinity for the red cells. Their cultivation *in vitro* absolutely classifies them as microorganisms.

This paper is concerned mainly with the blood changes, continued studies on the staining properties of the virus, the microscopical changes in the organs and the cultivation of the organism.

The blood changes occurring in hog cholera was investigated with twelve pigs. The virus used in these experiments was obtained from highly virulent hog cholera blood. The undiluted centrifuged serum was filtered through a Chamberland filter F. Eight of the twelve pigs were infected intramuscularly with filtered hog cholera serum. The remaining four were kept in the same stable with the infected animals to become infected spontaneously. From the eight pigs infected, pig 7 died spontaneously on the twelfth day. Pigs 5, 6, and 8, were killed in agony on the 15th, 13th, and 14th day respectively after inoculation. Pigs 9, 10, 11, and 12 acquired hog cholera spontaneously. Pig 9 died after 12 days, 10 was killed in agony on the 15th day, and 11 and 12 recovered.

The postmortems of the pigs showed the typical lesions of hog cholera. Several hundred cultures were made from the blood and different organs. Three of the pigs were secondarily infected with *Bact. suipestifer*, two with *Bact. suipestifer* and *suisepticus* and one was a pure hog cholera infection.

The following tables show the absolute leucocyte count and the differential count before and after infection.

## Table No. I.

### Blood Count Before Inoculation.

| March 7th, 1917 | Pig 1 | Pig 2 | Pig 3 | Pig 4 | Pig 5 | Pig 6 | Pig 7 | Pig 8 | Pig 9 | Pig 10 | Pig 11 | Pig 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Absolute Leucocyte Count | 37,500 | 12,000 | 20,125 | 37,500 | 28,750 | 18,125 | 28,410 | 27,625 | | | | |
| Differential Count Poly-Neutrophiles | 41.1% | 61.00% | 46.4% | 34.7% | 59.66% | 22.50% | 32.10% | 46.50% | 36.00% | 46.30% | 43.00% | 47.60% |
| Poly-Eosinophiles | 3.0% | 2.33% | 4.7% | 2.6% | 2.00% | 17.00% | 1.60% | 3.00% | 1.50% | 2.30% | 4.30% | 1.60% |
| Poly-Basophiles | .3% | 1.00% | .5% | 1.6% | | 3.60% | .50% | 1.90% | 1.50% | .50% | 1.20% | 1.10% |
| Small Lymphocytes | 55.2% | 35.00% | 47.0% | 60.1% | 38.00% | 56.70% | 65.70% | 48.00% | 61.00% | 50.90% | 51.50% | 49.60% |
| Large Lymphocytes | | | .5% | | | | | | | | | |

### Blood Count After Inoculation.

| March 15th, 1917 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Absolute Leucocyte Count | 12,000 | 12,000 | 15,500 | | 7,500 | 5,000 | 14,000 | | | | | |
| Differential Count Poly-Neutrophiles | 54.50% | 42.63% | 23.68% | 44.85% | 64.65% | 64.10% | 72.50% | | | | | |
| Poly-Eosinophiles | .50% | | 2.46% | | .46% | .93% | | | | | | |
| Poly-Basophiles | 1.00% | | .41% | | .92% | .41% | | | | | | |
| Large Lymphocytes | .15% | | | | | | 1.00% | | | | | |
| Medium Lymphocytes | 10.00% | 1.93% | 6.17% | | .72% | 8.87% | | | | | | |
| Small Lymphocytes | 33.50% | 53.65% | 67.07% | 55.14% | 33.02% | 25.70% | 26.50% | | | | | |
| Neutrophile Myelocytes | | | | | | | | | | | | |
| Plasma Cells | | | | | | | | | | | | |

## Table No. II.

### Blood Count After Inoculation.

| March 19th, 1917 | Pig 8 | March 20th, 1917 | Pig 6 |
|---|---|---|---|
| Absolute Leucocyte Count | 10,000 | Absolute Leucocyte Count | 12,500 |
| Differential Count | | Differential Count | |
| Poly-Neutrophiles | 48.23% | Poly-Neutrophiles | 66.33% |
| Poly-Eosinophiles | .47% | Poly-Eosinophiles | .46% |
| Poly-Basophiles | 1.91% | Poly-Basophiles | .46% |
| Large Lymphocytes | | Large Lymphocytes | 6.33% |
| Medium Lymphocytes | 6.22% | Small Lymphocytes | 6.33% |
| Small Lymphocytes | 36.00% | Medium Lymphocytes | 10.52% |
| Neutrophile Myelocytes | .95% | Neutrophile Myelocytes | 10.04% |
| Plasma Cells | .47% | Plasma Cells | .46% |

## Table No. III.

### Blood Count After Inoculation.

| March 21, 1917. | Pig 2 | Pig 4 | Pig 5 | Pig 11 | Pig 12 |
|---|---|---|---|---|---|
| Absolute Leucocyte Count | | | 47,500 | | 10,000 |
| Differential Count | | | | | |
| Poly-Neutrophiles | 42.63% | 41.66% | 46.36% | 46.50% | 50.86% |
| Poly-Eosinophiles | | 1.00% | | | .87% |
| Poly-Basophiles | | .33% | | | .43% |
| Large Lymphocytes | | .66% | | | |
| Medium Lymphocytes | 1.93% | | .45% | 1.00% | |
| Small Lymphocytes | 53.65% | 56.33% | 50.00% | 26.00% | 47.82% |
| Neutrophile Myelocytes | 1.91% | | 3.18% | 10.05% | |
| Plasma Cells | | | | 16.00% | |

| March 22, 1917 | Pig 10 |
|---|---|
| Absolute Leucocyte Count | 41,000 |
| Differential Count | |
| Poly-Neutrophiles | 65.44% |
| Poly-Eosinophiles | |
| Poly-Basophiles | |
| Large Lymphocytes | 15.20% |
| Medium Lymphocytes | 7.80% |
| Small Lymphocytes | 14.17% |
| Neutrophile Myelocytes | 5.70% |
| Plasma Cells | .50% |

These blood counts cannot be regarded as conclusive on account of their incompleteness. The lack of proper working facilities and the remoteness of the stable from the laboratory prevented daily blood counts and the destruction of samples in transport to the laboratory resulting in the loss of valuable data necessitates a repetition of the above work. The tables show that in hog cholera there is at first a decrease in the absolute leucocyte count. In some of the pigs 5 and 6 a leucopenia was observed. Shortly before death there may be a considerable leucocyte increase. (Pig 10, 41,000, pig 5, 47,500). In the majority of the cases the differential count showed a decided increase in the polynuclear neutrophiles, with a decrease in the lymphocytes. The polynuclear eosinophiles and basophiles are greatly diminished in number or disappear entirely. Neutrophile myelocytes and plasma cells may appear shortly before death. If the increase in leucocytes just before death is occasioned primarily by the hog cholera virus or is due to a secondary infection with *Bact. suipestifer* or *suisepticus* cannot be determined. Both pigs showing a high ante-mortem leucocyte count where secondarily infected with *Bact. suipestifer.*

The numerous blood smears obtained from infected pigs gave opportunity for a more extended study of the staining properties of hog cholera virus. The single staining with methylene azure carbonate after fixation with either methyl alcohol or vanadium or uranium salts is without doubt the best method for demonstrating the virus in the different cellular elements of the blood. Previous experience has shown that staining with methyl alcohol solution of eosin—methylene blue—toluidine blue (2) for three minutes either alone or followed by diluted Giemsa solution for 15 minutes gave negative results. Endothelial cells were not made visible. A differential staining method would be of great value to distinguish the virus from mitochondria. In staining some hog cholera smears by the above method, in several which were accidentally exposed for 16 hours in a diluted slightly alkaline Giemsa solution, huge masses of virus attached to the red cells as well as extra cellular masses were rendered visible. Groups of red cells were densely covered with a deep-blue stained virus. Single cocci could be seen both on the edges and between the red cells. A careful examination of these smears showed no mitochondria with the exception of some very faintly stained occurring in a few endothelial cells so little tinted as to be just about visible. This method of staining

therefore affords a differentiation between the virus and the granular forms of mitochondria which might be mistaken for the microorganism by the inexperienced observer. In brief the staining method is carried out as follows: the air-dried smears are stained in a methyl alcohol solution of eosine—methylene blue—toluidine blue for three or four minutes, immersed for a few seconds in 96% alcohol, washed in water, superficially dried and then floated for 16 hours on a diluted Giesma solution (1 to 10) alkalized with 2 drops of 1% sodium carbonate or borax solution to 10 c.c. The smears are thoroughly washed in running water, air dried and then mounted in cedar oil or better in paraffin oil. This method is superior to the simple methylene azure carbonate staining for the demonstration of the virus attached to the red cells. The virus in the endothelial cells, however, is not made visible. Theoretically, the acid eosine probably acts as a mordant for the virus and only very slightly for the mitochondria.

While the gross pathology of hog cholera is well known very little attention has been given to the microscopic changes. Macroscopically very important changes to which sufficient prominence has not been given in the past occur in the lymphatic-lienal system. As might be expected from the similarity of hog cholera to typhus fever, constant changes in the brain are found, showing congestion of the pia-arachnoidea, multiple small hemorrhages of the brain substance and encephalitic changes. A more detailed report on both the macroscopic and microscopic changes will be published later since certain interesting findings necessitate further study with a different fixative before a complete report can be rendered.

A summary of the histological findings show that the most pronounced changes are found in the lymphatic system and spleen. The inflammatory reaction in both is of a pronounced plasma cellular character. The polynucleosis is almost absent. The plasma cell infiltration is noted throughout the lymphatic system and spleen. The plasma cells are of lymphocytic origin. The proliferation of the endothelial cells diffuse and circumscribed in both the lymph glands and spleen with a tendency to fibrous induration is characteristic. Congestion, edema, hemorrhages and siderosis are of common occurrence. Endothelial cell necrosis in both lymph glands and spleen is often noted. A pronounced perivascular infiltration is found in almost all the organs and cutis. Cellular infiltration is of a plasma-cellular and of a lymphocytic character.

The brain shows typical encephalitis and multiple hemorrhages into the brain substance. The liver shows congestion, cyanotic atrophy, sometimes diffuse hepatitis, cloudy swelling and siderosis. The kidney shows pronounced glomeruli nephritis, congestion, hemorrhages in the cortex and pelvis. The myocardium shows localized round cell infiltration, hemorrhages and cloudy swelling of the muscle fibres. A marked proliferation of the endothelial lining is seen throughout the vascular system.

For the cultivation of the virus both the blood and the organs of the six pigs which succumbed to hog cholera were used. The pigs which were killed in agony were bled and the blood collected aseptically. It was defibrinated, centrifuged and the serum filtered through a Berkfeld filter V. The filtrate was first tested aerobically and anaerobically for common bacterial contamination. Only perfectly sterile serum was used for culture purposes. Unfiltered sterile carcinomatous ascites and sterile unfiltered horse serum were the culture media used. Either was filled into sterile test tubes to which a piece of fresh kidney or liver tissue from a guinea pig or rabbit was added and covered with sterile paraffin oil. The tubes so prepared were incubated for a week at 37°C. Cultures were made from each tube, aerobically and anaerobically in plain bouillon and grape sugar agar to insure complete sterility. To the sterile culture tubes filtered hog cholera serum equal in amount to the culture medium was added by means of a sterile pipette. In one case, in which the blood taken directly from the heart with a syringe proved to be sterile the undefibrinated blood was added directly to the culture medium. Cultures were also made by filling the filtered hog cholera serum into test tubes adding a small piece of fresh guinea pig liver. These were kept under anaerobic conditions in a Novy jar.

Cultures were made by taking pieces of organs aseptically removed from the dead animal and immersing them in unfiltered sterile carcinomatous ascites or unfiltered sterile horse serum and then covering with sterile paraffin oil. The majority of the organs were secondarily infected and the cultures which showed marked infection were discarded. Those which were but slightly contaminated, after incubation for a week, were filtered first through filter paper and then through a Berkfeld filter V. The filtrates so obtained were used for subcultures as described above.

Changes in the appearance of the otherwise bacterially free culture are but slight. After two to three weeks the culture medium shows a slight opalescence which gradually disseminated throughout the liquid. In cultures made from filtered virus with the addition of a piece of fresh tissue a growth is observed in four weeks. In others, however, where the presence of cocci was demonstrated microscopically hardly any change in the culture medium could be noted.

Several hundred cultures prepared as just described, after three or four weeks incubation were examined microscopically and cultures made in the common culture mediums both aerobically and anaerobically. Grossly contaminated cultures were rejected. For the microscopical examination one to two c.c. of the culture was diluted with normal sterile salt solution to 10 to 20 c.c. and centrifuged. Smears were made from the sediment and stained in the usual way after Gram or with carbol fuchsin or methylene azure carbonate. Of all the cultures but four percent showed the small cocci found in the blood stream. The greatest percentage of cultures was obtained from those made with unfiltered blood. Only the lymph glands of the organs used, yielded positive cultures. Positive cultures were also obtained from the filtered serum alone with addition of fresh tissue under anaerobic conditions.

The growth in the primary cultures is not very abundant and consists of small isolated cocci or diplococci or agglomerated masses of cocci. They are Gram negative and their size is just on the limit of microscopic visibility. After decolorization with alcohol acetone at least a half hour is necessary for a distinct staining with carbolfuchsin. The Gram fuchsin method of staining is more satisfactory than the methylene azure carbonate method since the latter allows no sharp differentiation of microorganisms from the granular detritus of the sediment. Subcultures made on the same culture medium with the addition of a piece of fresh tissue show a very slight growth only in plain ascites, or ascites mixed with an equal part of glucose bouillon, or in horse serum or horse serum mixed with an equal part of glucose bouillon a very slight opalescence is noted after eight or ten days incubation. Thus far the third subculture has been obtained. On solid culture media, glucose ascites agar, both aerobically or anaerobically no growth was obtained. The filtered cultures either from ascites or horse serum with or without the addition of grape sugar

bouillon on inoculation yielded subcultures. These last experiments prove that the cultures contain a filterable actively growing virus.

This investigation confirms our previous microscopic findings demonstrating the same microorganisms in the blood of hogs inoculated with filtered hog cholera virus. With a modified staining method it was possible to demonstrate huge masses of microorganisms attached to the red cells corroborating the earlier biological experiment of K. F. Meyer,(3) who showed that the hog cholera virus tenaciously adhered to the red blood cells and also demonstrated that it was impossible to remove the virus from the red blood cells by repeated washings with normal salt solution followed by centrifuging. He further showed that the addition of normal red cells from the rabbit and guinea pig will also precipitate the virus from serum, but it can be partially removed by washing with normal salt solution.

It was possible to grow microorganisms both from the filtered and the unfiltered blood as well as from the organs in the form of a minute Gram negative coccus which has the same morphological habitus and the same biological properties as that found in the blood stream.

As soon as sufficiently distant subcultures are obtained such that the transmission of the original virus is absolutely excluded, animal experiments will be made to furnish conclusive proof that this organism is the causative agent of hog cholera.

## LITERATURE

1. F. Proescher and H. A. Seil. The Etiology of Hog Cholera. *Journal of the American Veterinary Medical Association*, April, 1917.
2. F. Proescher. Zur Blutfärbetechnik. *Centralblatt für Allgemeine Pathologie and Pathologische Anatomie.* Band. XVI 1905.
3. K. F. Meyer. Filterable Viruses. *American Veterinary Review*, 1914.

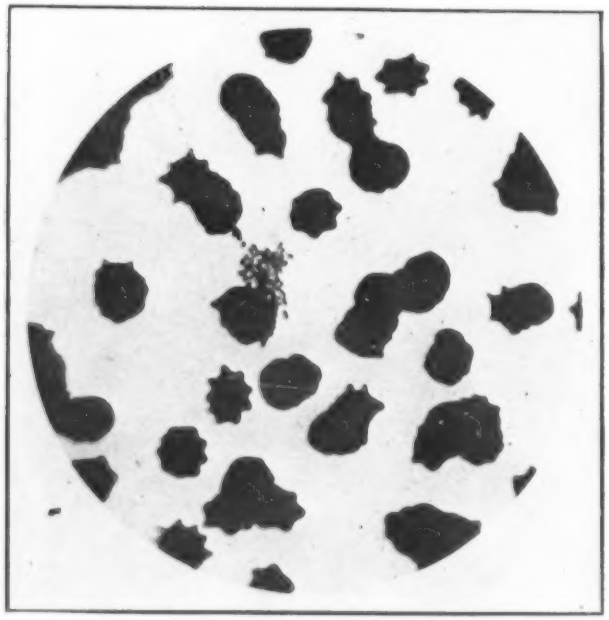

FIGURE 1—Smear—Hog Cholera Blood—showing extracellular virus—combined staining method. Proescher-Giemsa. Leitz Oc. 2. Oil immersion 1/12.

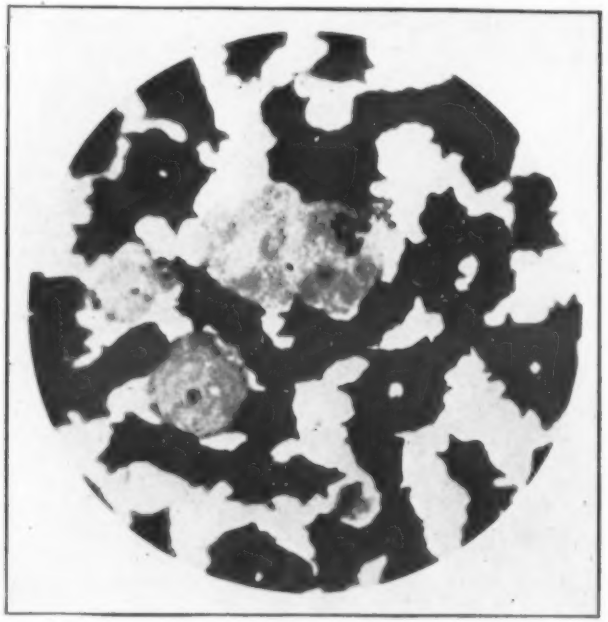

FIGURE 2—Smear—Hog Cholera Blood—showing virus both in the protoplasm of a polynuclear leucocyte and also extracellular combined staining. Proescher-Giemsa. Leitz Oc. 4. Oil immersion 1/12.

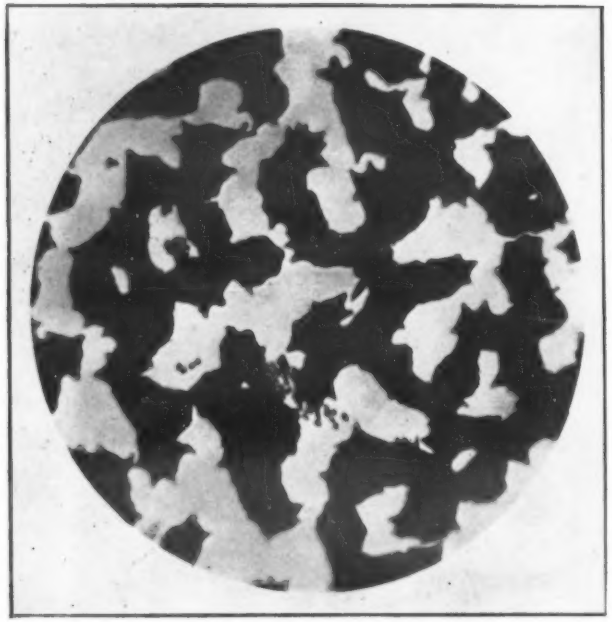

FIGURE 3—Smear—Hog Cholera Blood—showing extracellular virus—combined staining method. Proescher-Giemsa. Leitz Oc. 2. Oil immersion 1/12.

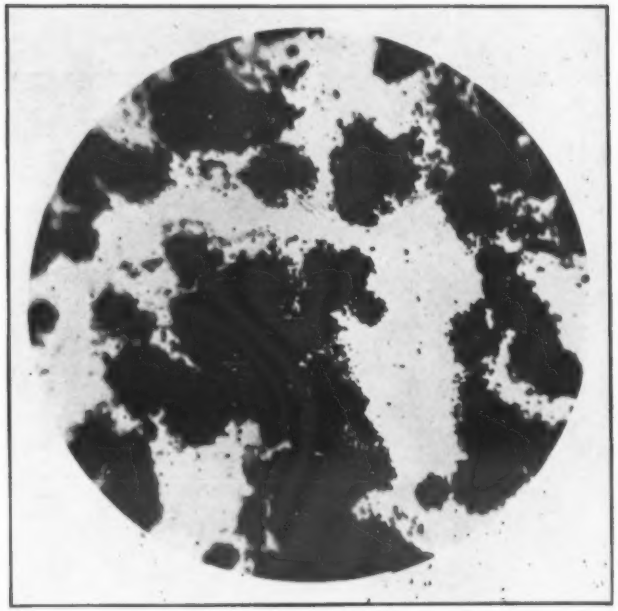

FIGURE 4—Smear—Hog Cholera Blood—showing huge masses of virus attached to red cells—combined staining method. Proescher-Giemsa. Leitz Oc. 2. Oil immersion 1/12.

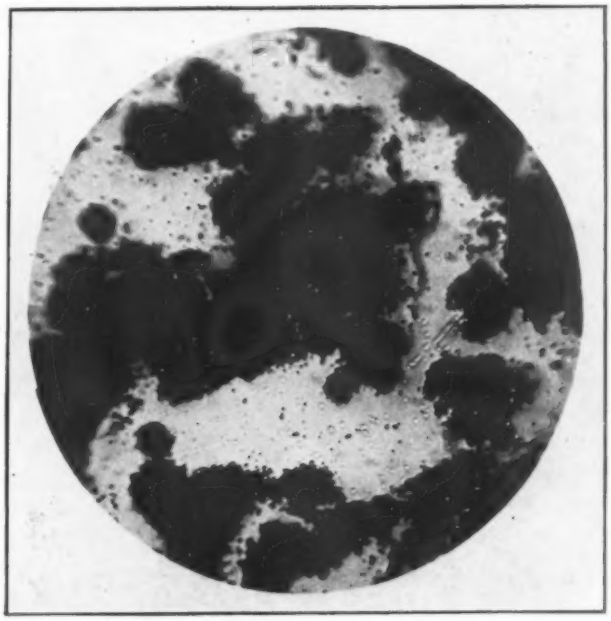

FIGURE 5—Smear—Hog Cholera Blood—showing huge masses of virus attached to red cells—combined staining method. Proescher-Giemsa. Leitz Oc. 2. Oil immersion 1/12.

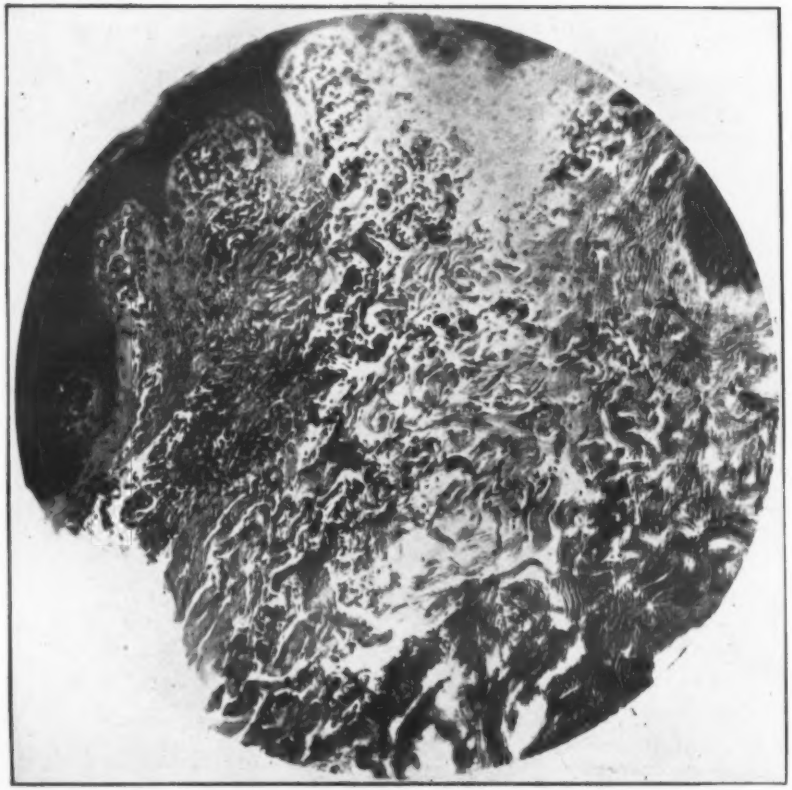

FIGURE 6—Cutis (abdomen) showing perivascular infiltration of the capillaries of the papillary layer and corium (van Gieson). Leitz Oc. 2. Obj. 4.

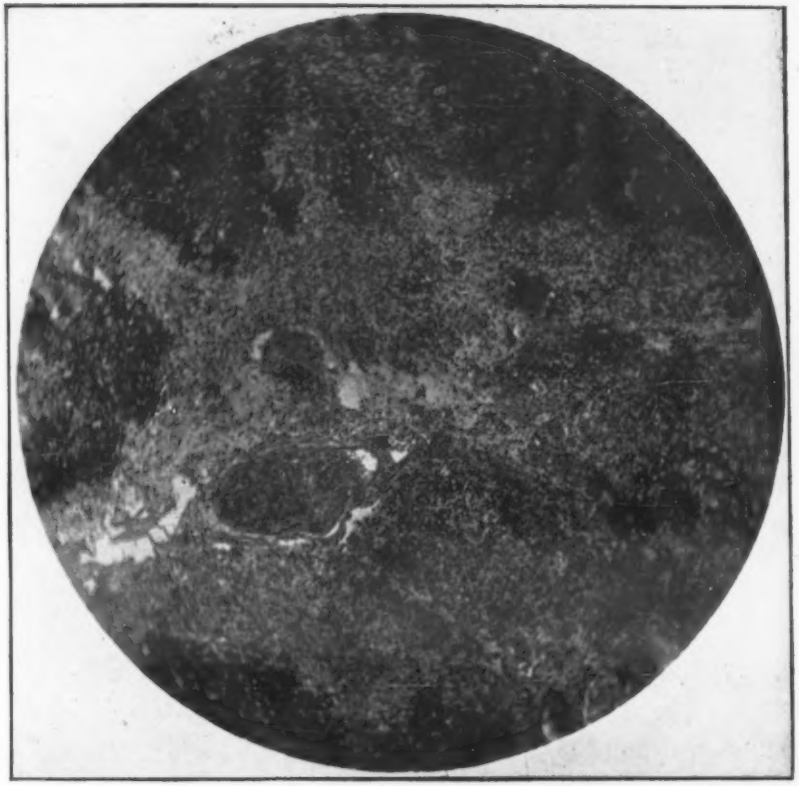

FIGURE 7—Mesenteric lymphgland—showing congestion, proliferation of endothelium cells and plasma cell infiltration. (eosin-hematoxylin) Leitz Oc. 2. Obj. 3.

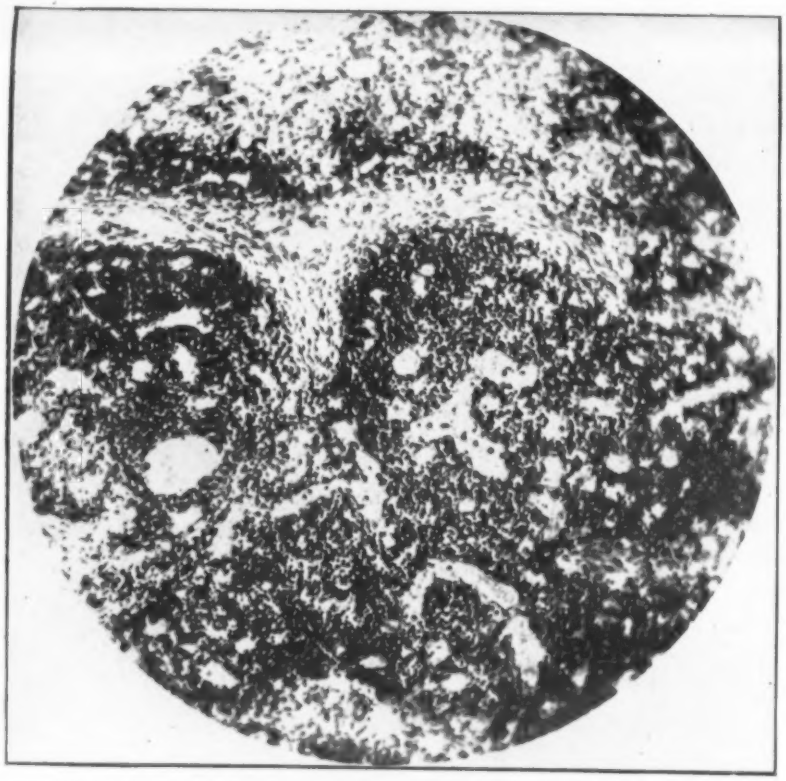

FIGURE 8—Mesenteric lymphgland—showing circumscribed and diffuse proliferation of endothelium cells and plasma cell infiltration. (methylgreen-pyronin). Leitz Oc. 2. Obj. 4.

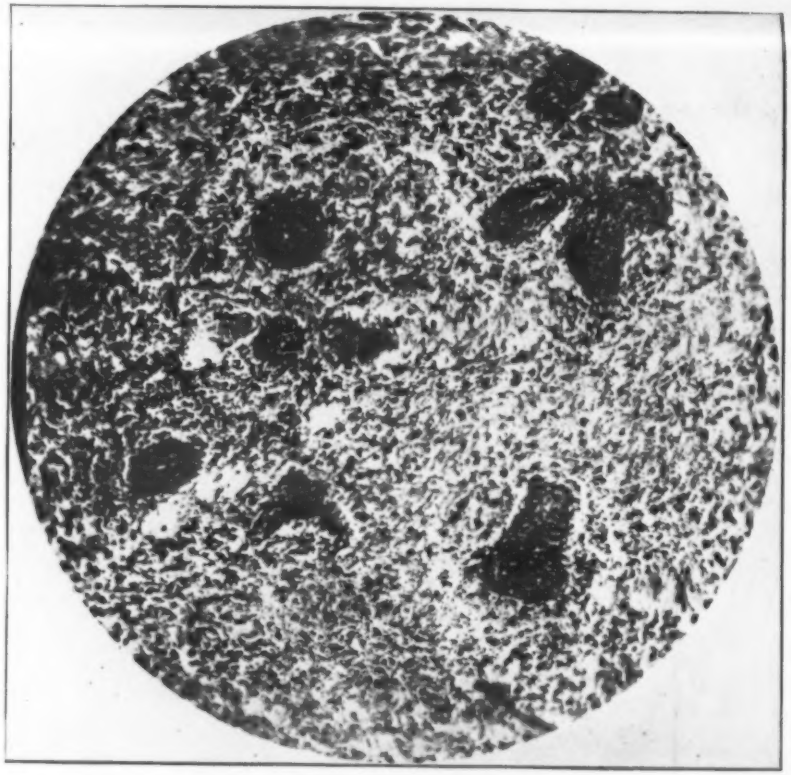

FIGURE 9—Spleen—showing circumscribed proliferation of endothelium cells and plasma cells infiltration. (methyl-green-pyronin). Leitz Oc. 2. Obj. 4.

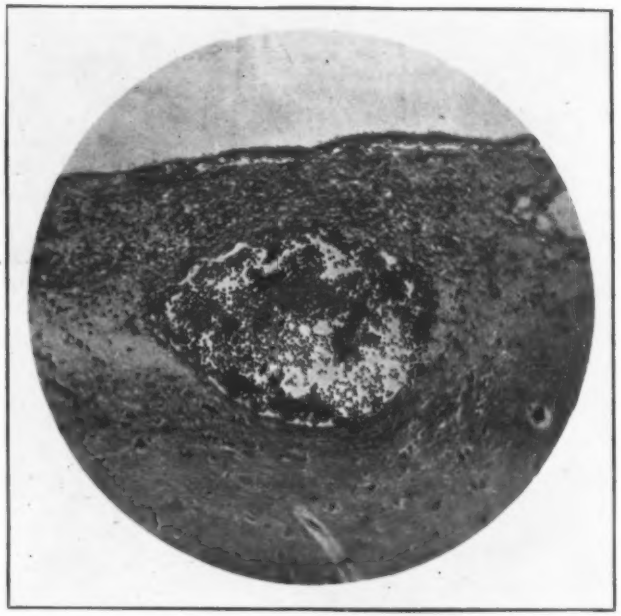

FIGURE 10—Cerebrum, frontal lobe—showing congestion and infiltration of cortex with lymphocytes and plasma cells. (eosin-hematoxylin). Leitz Oc. 2. Obj. 4.

FIGURE 11—Ceremrum—frontal lobe—showing ruptured blood vessel with marked perivascular infiltration. (methyl-green-pyronin). Leitz Oc. 2. Obj. 4.

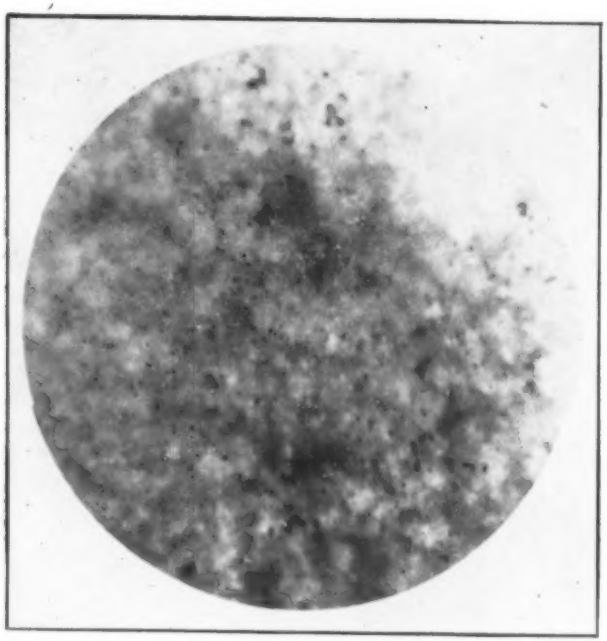

FIGURE 12—Smear of second subculture of Hog-Cholera virus from blood—Gram-fuchsin. Leitz Oc. 2. Oil immersion 1/12.

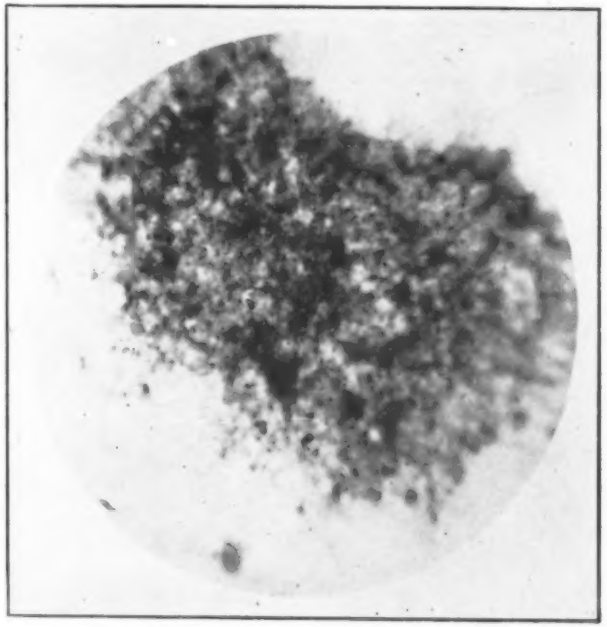

FIGURE 13—Smear of second subculture of Hog-Cholera virus from lymphgland. (Gram fuchsin). Leitz Oc. 2. Oil immersion 1/12.

# ROARING IN HORSES AS IT RELATES TO HORSE BREEDING*

W. L. WILLIAMS, Ithaca, N. Y.

The rapid encroachment of other forms of energy upon the field of usefulness of the horse and the increased cost of the production and maintenance of horses, are serving to demand greater individual efficiency. While the number of horses tends to decrease instead of increase the need for the horse in those positions still occupied by him are as insistent and important as at any time in history. The urgent need for horses has never been better illustrated than during the present world war. Other forms of energy have been introduced in such great volume and intensity that it would appear upon superficial observation that the war horse was extinct, but never before in the history of the world have nations gone so far, bought so many horses, or paid so high prices.

Laws to encourage horse breeding are as old as history. It has been suggested that the Mosaic Law forbidding the eating of horsemeat was prompted by the national need for conserving horse breeding. Several methods for encouraging horse breeding have long been in operation. Governments have subsidized horse fairs, either alone or as a part of agricultural fairs, and have paid liberal premiums to successful breeders. Governments have, in connection with agricultural colleges, maintained representative studs as a part of their material for teaching. Governments have also encouraged horse breeding by subsidizing superior stallions and their get and by inhibiting the use of inferior stallions by a system of stallion registration. The laws therefore have as their aim the rewarding of good horse breeding and the penalizing of bad breeding. Laws relating to horse breeding were naturally first enacted in the highly civilized continental European states, where the cost of horse production and maintenance were greatest and the demands for efficiency highest. The general aims of the laws were to perpetuate valuable lineage as expressed in pedigree, to secure for breeding purposes animals of high individual

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merit, and to guard the progeny against diseases and defects so far as the parent might exert any influence.

It is highly interesting to note that present-day laws regulating horse breeding bear clear evidences of ancient origin. They reflect clearly today the conception of pathology of two or three centuries ago, especially in the field of forbidden diseases. The ancient concept of disease was that it came either from the parent or from evil spirits. The prevention or cure of disease was therefore predicated upon the elimination of the offending parent or doing away with the evil spirit. The evil spirits of the ancients are visualized today by pathogenic organisms and the parent as a perpetuator of disease still holds his ancient sway. My theme, roaring in relation to horse breeding, occupies a conspicuous place in the laws of the State of New York of 1916 concerning the licensing of stallions. Section 122 of those laws states:

"Any incurable, infectious or contagious disease with which the stallion may be afflicted shall disqualify such stallion for public service.

"Any transmissible unsoundness with which the stallion may be afflicted shall be named as such in said certificate of enrollment. The following diseases and unsoundnesses shall be defined as transmissible, for the purpose of this article: recurrent ophthalmia (moon blindness); cataract; amaurosis (glass eye); laryngeal hemiplegia (roaring or whistling); stringhalt; bone spavin, sidebone, navicular disease, and curb when associated with curby conformation of the hocks."

The stallion registration law of New York consequently names two groups of diseases which are to be considered in the enrollment of stallions for public service. In the first group, that of incurable infections or contagious diseases, no specific list of diseases is mentioned. It includes, inferentially, dourine, glanders, tuberculosis, and infectious lymphangitis. This paragraph of the law is devoid of practical significance because other precedent laws dictate that such animals shall be destroyed or kept in rigid quarantine.

Even if this group of diseases were not cared for by other laws, the stallion registration law would possess very scant efficiency, and might even work harm. A certificate made on August first serves as a health certificate for eight months—until April first of the next calendar year—but if issued on August second it has a life of twenty months. In either case, there is ample time for the stallion to acquire any disease of the group.

A stallion affected with one of the alleged non-infectious transmissible group of diseases is eligible to enrollment for public service, but is declared legally unsound, and the license so states. While the stallion is legally unsound, his progeny are legally sound. The law accordingly does not injure in any way the get of a legally unsound stallion. The only burden placed upon the stallion alleged to have a heritable unsoundness is that some prospective clients may be deterred from patronizing the stallion because he has been declared legally unsound. The actual difference between the present law and no law at all in this respect is not great. Most of the diseases named in the group are in clear evidence and freely observable by any prospective client. As a rule, the owners of mares have some belief about the heredity of these diseases and will withhold or extend their patronage according to their views. The stallion law, by publicly declaring the presence of the disease and its heritable character, may change the views of some mare owners. The owner of the stallion legally declared unsound will not be deterred by the law from asserting that the disease is not heritable and may do all within his power to convince prospective clients accordingly. So it occurs that the stallion declared legally unsound because of a heritable disease is not barred from service and suffers only from the stigma of the official publication of his alleged unsoundness, while his get are legally sound even though the sire has been declared affected with a disease transmissible to his progeny. If any of his get are stallions, they are legally sound and licensable as sound until such date as the alleged heritable unsoundness develops, when they too become legally unsound. In the meantime, they have had opportunity to transmit the alleged hereditary unsoundness to their get before they become legally unsound from an inherited affection. Accepting the allegation of the inheritance, our law permits the hereditary disease to go on perpetually.

If a stallion licensed as sound for eight or ten breeding seasons is fed on bad hay and contracts heaves, he becomes legally unsound, but his progeny of eight or ten years of stud service are legally sound. He is still licensable as unsound and his get, like those of his legally sound career, are also sound. He may then be carefully fed, the heaves may disappear, the stallion is again legally sound, and his get, before, during, and after his legal unsoundness, are all alike legally sound. They are eligible to license

as sound breeding animals and to entrance in state fairs as sound animals.

In the New York law, curb is a highly illustrative example of transmissible disease. "Curb, when associated with curby formation of the hocks," is an hereditary unsoundness. I am not certain what constitutes curb, but that is no matter. The horse is not legally unsound because he has curb nor because he has curby hocks. Neither the disease nor the formation inviting the disease offends the law. He may have ever so large a curb, or he may have two curbs, but that does not make him legally unsound, unless with the rest he has curby hocks, and his hocks may be ever so curby, bent like the front end of a toboggan, yet he is legally sound and eligible to registration as sound for breeding purposes. So long as he is kept in a bandbox and is never permitted to slip, draw a load or otherwise strain the weak member, he is legally sound, but, let him slip or suddenly jump and show a curb, he immediately becomes an unsound sire.

The New York law proceeds upon the basis that the designated diseases are hereditary but that any malformation or tissue defect which tends to cause a disease is not hereditary. If for example scrotal hernia were included in the list, it would not be the open ring which would contitute legal unsoundness, but when the herniated intestines became incarcerated the stallion would become legally unsound. As he would probably die in a few hours, this would matter little to either stallion or owner, and, since only the incarceration of the intestine renders the stallion legally unsound, scrotal hernia is omitted from the list of transmissible unsoundnesses.

Turning to the specific subject of roaring, similar conditions apply. A stallion may remain legally sound for several years and render highly satisfactory service in the stud, when suddenly it is discovered that he is a roarer. Then he becomes legally unsound, while his get remain legally sound. But under the New York law he must be a certain kind of roarer: in order to be unsound, he must have laryngeal hemiplegia. Should he have laryngeal biplegia, the law takes no account of him and he is presumably legally sound. A century ago when the pathologic concepts flourished upon which our modern (?) stallion laws are based, there was an abundance of laryngeal hemiplegia, but laryngeal biplegia was virtually unknown. Now, when most roarers are relieved sur-

gically, practically every operator recognizes laryngeal biplegia only and operates upon both sides of the larynx. To the modern surgeon, larygeal hemiplegia is a tradition. Here, again, the law apparently does not aim to declare a horse legally unsound because he roars, because he has a defect which renders him liable to roar, nor because there is laryngeal paralysis, either unilateral or bilateral. The horse is apparently legally unsound under the law only when he has laryngeal hemiplegia and roars or whistles. If the paralysis is present and the roaring naturally obviated, or if the roaring has developed and been later relieved surgically, the animal is legally sound. At least, I find no demand in the law that a stallion cured of roaring be declared legally unsound. Indeed, it would be difficult to declare a stallion unsound when no unsoundness is detectable by ordinary examination. Since the introduction in 1905 of a successful operation for roaring, many breeding stallions have been operated upon successfully in the State of New York, and presumably most or all of them have been registered as sound under the stallion registration laws. Legally, I see no way by which a veterinarian, without knowledge of the operation having been performed, examining such stallions and failing to detect any roaring, can do otherwise than certify them as sound. Ethically, I should not hesitate a moment in certifying that such a stallion was sound, though the law would bar me from certifying that the stallion which had not been successfully operated upon is sound. One veterinarian may pronounce a horse a roarer; another equally skillful and conscientious may consider him free. Consequently, if one veterinarian pronounces a stallion a roarer one year and another veterinarian pronounces him free from roaring the next year, the central authority and the law cannot tell whether the difference in report is one of opinion or whether in the interval surgical relief has been applied.

Behind all this maze of contradictions and ambiguities are some profound, basic scientific considerations. The most fundamental one is whether disease is heritable or not. In a strict etymologic sense, such chronic infections as tuberculosis, syphilis, and others are heritable—that is, they are readily transmitted from parent to offspring—but this is not our actual meaning of a heritable disease. As nearly as it can well be defined, it is a disease transmitted through and is an integral part of the germ plasm. The disease needs to be a part of the ovum or spermatozoon—not

a micro-organism borne in the generative cell, but an inseparable part of the germ cell. The evidence of such disease transmission has been disintegrating under the inexorable revelations of science until no disease exists in which there is good evidence of such hereditary transmission.

The believers in heritable diseases then fall back upon a far stronger line of defense, the hereditary transmission of a tendency to disease, of a vulnerability. The transmission of anatomical characters is quite freely admitted and affords the scientific basis for breeding. If a calf belonging to a horned breed is born hornless, its peculiarity tends to be repeated in its progeny. We understand that if a male has one cryptorchid testicle, his male progeny will be largely cryptorchid. That is the fixation of a variation in structural type and is transmitted in the same manner as color, form, or disposition. It is not a disease, nor in any appreciable measure a tendency to disease. Referring to our New York stallion law, curby hocks always predispose the individual to curb: the hock is weakened by its faulty build and any strain may precipitate a curb. The curby hocks are just as heritable as straight hocks, and consequently the get of a curby-hocked horse may inherit curby hocks, which predispose to curb.

In roaring no such variation in anatomical structure or arrangement is recognizable. The young colt is sound, and the roaring develops suddenly and unexpectedly. Some have said that a certain conformation predisposes to roaring, but the allegations are contradictory. Some say it is the long, slender, finely chiseled neck, if the roarer present is of that type; others that it is the short, thick neck, with narrow inter-maxillary space. The doctrine of form as a cause of the disease usually bends to meet the present emergency.

In one important sense a hereditary vulnerability to a given disease must be recognized. Swine are vulnerable to hog cholera; other domestic animals and man are immune. Horses are hereditarily predisposed to heaves and to roaring; this is a generic heredity, without any relation to the subject under discussion.

Stallions become roarers more frequently than geldings and geldings far more frequently than mares. They are predisposed in the order named, but we cannot affect the prevalence of roaring from this standpoint because we have no control over sex. The vocal cords of the stallion are longest and of the lowest tone and

the ventricular sinuses of the stallion naturally larger than in the gelding or the mare. A larger volume of air may become impacted into the ventricles of the stallion than in that of the gelding or the mare, and hence the stallion is more likely to roar. There is no evidence that the paralysis is most frequent in the stallion, but merely that the prominent roaring is most frequent. In the dissecting room, atrophy of the laryngeal muscles is very common in old geldings and mares, though they were not known to have been roarers.

Roaring is very common amongst hunters, as compared with other breeds of horses. In a way hunters are predisposed or vulnerable—not to the disease, but to the symptom of roaring. The hunter is put to an extreme test at a comparatively early age. If the vocal apparatus is paretic, the air stream becomes impacted into the laryngeal ventricles, distends them, further overtaxes the paretic muscles, and eventually brings about a much enlarged ventricle, which, filled with air upon slight provocation, forces the vocal cords and arytenoid cartilage far out into the glottis, obstructs it, and chokes the animal. An ordinary horse of no particular breeding having the same degree of laryngeal paralysis is not exerted—the ventricles are not distended with air, the connective tissue gradually retracts, and the vocal cords and arytenoids are passively held out of the glottis—the horse does not roar.

When a study is made of the pathology and etiology of roaring, little is found to suggest heredity. Thomassen of Utrecht, by careful study, showed that roaring is due to a peripheral degeneration of the recurrent laryngeal nerves, with the inevitable paralysis and atrophy of the dilator muscles of the larynx, should the disease be sufficiently chronic. It is difficult for one to imagine that the peripheral end of a motor nerve—a structure which has grown out from the spinal cord—could undergo a degeneration from heritable causes. It might be understood how a foal could be born with an imperfect larynx because of a congenital defect of the larynx of a parent, but how the animal could be born with a perfect larynx, the organ function well for three to six or seven years, and then undergo motor nerve degeneration from hereditary causes, is difficult of comprehension. So specific a degeneration, so uniform in its pathologic behavior, as the degeneration of the recurrent nerves at their peripheral ends, suggests that most cases, perhaps nearly all cases, are referable to

one common cause. It is interesting therefore to try to select cases where the causes appear to be plain in outline, however cloudy in detail, and see what they teach. Roaring occurs in two well marked groups, from the standpoint of frequency—enzootic and isolated—and in two groups as to duration—acute and chronic. In the enzootic outbreaks of roaring the very enzootic character denies most emphatically the hereditary character of the disease. Roaring suddenly breaks out and involves simultaneously or in rapid succession a large percentage of horses or mules in a stable, a field, or upon an open range. The affected animals have no common source of origin except they belong to the equidae or are hybrids with the ass. Had their ancestors been cattle, sheep, or swine, confessedly they would not have roared, because these latter genera are immune to the fundamental causes of roaring. Aside from the generic vulnerability of the horse to the causes of roaring, hereditary predisposition is in these cases overthrown. For example, in one instance, near Rome, New York, a few years since, twenty-five mules belonging to a contractor were wintered by a canning establishment upon pea ensilage. In the spring, eight of them, or thirty per cent., were roarers. One strangled to death; the others suffered in varying degrees. The mules were presumably bought in the open market, probably at one time, of unknown parentage beyond the fact that they were hybrids. It is scarcely conceivable that they were importantly related. Even had they all been sired by the same jack, it is not conceivable that such a group of mules of varying ages would suddenly and simultaneously give way to a hereditary taint. It must be accounted for in another way. All were typical roarers and, when operated upon, each presented the regular characters of roaring.

In central Illinois, some thirty years ago, there was a severe, early frost which froze much green corn. The weather then became warmer and the frozen corn moulded on the stalks in the fields. In one such field a client placed twenty or thirty mares and colts, after the sound ears of corn had been gathered. The animals were not intimately related. Several were by one of the sires on the farm, but all the sires were sound and so remained. Some of the animals were imported from France; others were home bred. A large proportion of the animals suddenly became roarers. The first one was an aged mare which strangled and fell

while at play in the field. Apparently there was not only laryngeal paralysis, but also general paralysis, and she lay quietly on the ground until I reached her several hours later. Then she got up and appeared perfectly well. The next to show the disease was a young imported mare, which while at play strangled and fell dead. Then it was observed that several of the animals would roar if driven rapidly. The stallion and some other horses kept in the stable and fed the ripe ears of corn gathered in the same field were sound. Surely such an eruption of roaring could not be attributed to heredity.

At about the same date, several serious outbreaks of roaring were recorded upon the open ranges of Colorado in which large numbers of horses inexplicably and simultaneously became affected. At nearly the same time a large number of horses in the Silver Bow valley near Butte, Montana, became roarers, and many strangled to death. Suits for damages were brought or contemplated against the owners of certain smelters, upon the hypothesis that the mill tailings discharged into the stream, from which water was taken to irrigate the pastures, contained soluble mineral poisons which, contaminating the pastures, poisoned the horses and caused the roaring. (The Butte mines carry copper, silver, lead, arsenic, and other metals.)

A large omnibus company in Paris, many years ago, purchased a cargo of imported Indian vetches (*Lathyrus sativa*) and began feeding them to their horses. In a few weeks many horses became roarers; several strangled to death in the street and in the stable. The feeding of vetches was discontinued, and no new cases of roaring occurred. Similar experiences with the vetch occurred in Glasgow and other European cities. At the time I observed the outbreak of roaring amongst the horses being pastured in the cornfield where many frozen and later mouldy ears of corn were left on the stalks, the freezing of corn occurred of course upon other farms. Generally, however, only a few ears were frozen. The field in which the large degree of roaring occurred had suffered unusually severely from the freezing. Besides, most farmers pastured large numbers of cattle in the cornfields after gathering the sound ears and the cattle quickly ate all the frozen ears they could find. Cattle do not roar. Still, isolated roarers were common at that period. Upon one farm, with numeous horses, one case occurred. After three or four fits of

strangling, the animal fell dead in the street while she was being led at a walk to the halter, an hour or two after I had examined her and searched in vain for any disease. A careful autopsy revealed nothing. The juxtaposition in location and time suggests that the isolated and enzootic outbreaks were identical and that neither could logically be assigned to heredity. The question inevitably follows: If enzootic outbreaks are non-hereditary, can isolated cases be hereditary? So far as known, the pathology in each case is identical. There is a degeneration of the peripheral end of the recurrent laryngeal nerves, followed by paralysis and atrophy of the laryngeal muscles. When, so far as can be seen, the pathologic changes are identical, our rule is to assign them to identical causes. There occur in the lungs of glandered horses certain characteristic nodules, which, when they are observed, are regularly ascribed to glanders.

In the pronounced outbreaks of roaring, there exists a suggestion of a common cause—some contamination of the food. Peas, vetches, and corn are healthful foods which call for no defence. In isolated cases, may not the fundamental cause again be the food? We need only imagine that the food was but mildly contaminated, or perhaps one animal eats more of the offending food, or at a given period the health of the individual was poor and its power of resistance temporarily lowered. Thus might be explained the frequency of isolated roaring after contagious pneumonia.

There remains one other important consideration in connection with the transmission of a tendency to roaring from parent to offspring. I have granted that the horse, as a genus, is predisposed to roaring, and that swine and sheep are not—that there is a generic heredity. The laws of heredity are applicable alike to vigor and weakness, to progress and retrogression. In milk fever, there exists a heredity to disease as well marked as is known in animals, but the tendency to the disease is inseparably linked with dairying efficiency. Two methods of combating the disease arose. At first, as soon as a cow reached that degree of efficiency which made her subject to the disease she died from it, and ceased at once to produce further progeny to suffer from it. This was expensive to the dairying interests. Schmidt revealed a method for combating the disease which has almost eliminated it, though the hereditary tendency thereto is greater than ever.

In horses azoturia is observed in a certain type of animal and

by the rules of heredity horses subject to this mortal affection inherit the tendency from their parents. This tendency is an inseparable part of high efficiency. No effort is made to control the disease by the selection of sires, because the animals not subject to azoturia are not desired or desirable.

How frequently do poor horses become roarers? I think every careful observer will agree that the tendency to roaring increases as the vigor and efficiency of the animal. I do not mean that the nondescript cheap horse does not frequently suffer from peripheral degeneration of the nerve as the good horse. I am now discussing the symptom of roaring—that symptom which in the New York State law is legally recognized as heritable. The good horse is more severely tried. As a rule, such vigorous breeds as trotters and hunters are put to severe work early in life. They are called upon to tax their respiratory apparatus to the limit. The vocal apparatus included within the larynx, being paretic, the large stream of air demanded by the lungs during severe action impacts behind the vocal cords in the ventricles and distends them. Repeated impaction of the air stream only intensifies the paralysis and atrophy and increases the size of the ventricles, thus emphasizing the one symptom of roaring. The cheaper or less promising horse is not so severely tested and gradually the connective tissue framework of the atrophic muscles retracts, the ventricle does not enlarge, and the animal does not roar. Roaring, as measured by the symptom of inspiratory dyspnoea, is preeminently a disease of good horses, but when viewed from the standpoint of degenerative changes in the peripheral ends of the recurrent laryngeal nerves it is, so far as we know, approximately alike in all classes of horses, but the New York law condemns the good horse because he roars and approves the poor horse because he does not roar, though each has identical pathologic lesions.

In discussing this subject also, it should be remembered that roaring is not a disease of the respiratory apparatus proper. It is a disease of the vocal apparatus, and the respiratory difficulties encountered are incidental. It has been erroneously taught that the arytenoid cartilages and vocal cords are essential organs of respiration and deglutition. This has been completely overthrown by the roaring operation. After a successful operation, the horse is sound so far as respiration and deglutition goes. Vocally, the horse is unsound and mute. But horses are usually mute.

They use their vocal apparatus more rarely by far than other domestic animals. Has this failure to use the vocal organs predisposed them to degeneration?

Clinically and historically there is little or no evidence of the heredity of roaring. The enzootic outbreaks referred to can not be hereditary and may occur in any country. The isolated cases are subject to interesting restrictions. They are observed almost exclusively in horses kept in stables. The disease in isolated form is seen chiefly in low countries and, except some very marked enzootic outbreaks, is almost unknown in arid mountain regions. I have known many roarers. I have observed several stallions which were bad roarers and yet kept for breeding. I have not known a roarer to beget a roarer. I have been unable to trace roaring in a single case to a parent. If a stallion is kept upon a certain farm and there develops roaring, there is no logical reason why his get kept on the same farm, fed the same food, and in every way handled alike should not roar. It would be strange indeed if in a measure they did not. Apparently this is true. Horse breeders in low lying Great Britain believe explicitly in the heredity of roaring and are most vigorous in attempting to repress it by excluding affected sires, but they have more roarers than careless America. Ormond, I am told, got roarers in England—or perhaps it would be better to say that Ormond's progeny in England became roarers—and he was promptly sold out of the country. In America, I hear, his get did not roar more than the get of sound stallions.

Having regard for the above considerations, I have long held and still hold that it is an error in principle and in practice to exclude or handicap stallions in breeding because they are recognized as roarers. I believe that, whenever and wherever any recognizable congenital defect exists in an animal, such as umbilic and scrotal hernia, cryptorchidy, and curby hocks, the animals, whether male or female, should be discarded from breeding. When, however, a disease appears as a result of error in the food, housing, or care of the animal, such disease should not militate against the use of the animal for breeding. I am especially opposed to disqualifying a stallion for roaring because, in addition to my thorough disbelief in the heredity of roaring, the exclusion of such stallions is especially liable to destroy the usefulness of our best breeding stock.

# STATE BOARD EXAMINATIONS*

C. J. SIGMOND, Pipestone, Minn.

It has often been the subject of comment and inquiry that so many candidates fail in the examinations conducted by our board. There are various reasons for these failures. The board arranges its examinations with the greatest possible care, and spends as much time in conducting them and marking the results as any other board in the country. The examinations are given under civil service rules and at no time does an examiner know whose paper he is marking, as an identification card is filled in and handed in sealed, to the secretary of the board, and after that all papers are signed by a number contained on identification card, and no one is identified by these numbers until all marks are in and assembled. It endeavors, so far as possible, to avoid questions which necessitate memorizing abstract data and facts of no particular value, and in medicine to avoid difficult prescriptions and incompatible preparations. But it is very difficult for a board to frame questions that will fit the mental capacity of the majority of the candidates who appear before it, unless such board considers its work merely a perfunctory duty, to be disposed of in the easiest possible manner in the least possible amount of time.

The prevailing thought among the candidates of today seems to be to get through every task with the least exertion; and, therefore, it is impossible for these to show even fair knowledge in veterinary science, in the length of time they devote to the study of it and in which they use their time.

The idea seems to be general that a thorough knowledge of veterinary science may be obtained by the average student after three years in a veterinary college or university where veterinary science is taught. Such a feat is not impossible, but the students who would burn the amount of midnight oil necessary to its accomplishment, are comparatively few. I still believe, as I stated at one of our previous meetings, that it should be absolutely necessary for students to spend at least four months each year between sessions, with a qualified graduate veterinarian, thus getting practical experience.

*Presented at the meeting of the Minnesota Veterinary Medical Association, January 1917.

The young people of today, as a class, are not studious; they are pleasure loving. At school, college, and university, they waste a great deal of valuable time in outside activities, and social enjoyments and "cram" for examinations. I am a firm believer in a proper amount of recreation and social enjoyment, but these should never be allowed to interfere to any serious extent with the course of study. There are, of course, in every school some who can devote a great deal of time to matters outside of the prescribed course and still keep their work up to a high level, but the majority can not do this. When those who have wasted valuable time in one way or another, appear as candidates before a quasi-judicial body, such as a veterinary examining board, and are given examinations to determine how much of their education has been retained and how much of their education has filtered through, then we hear complaints of the unfairness of some of the questions given, the difficulty of the examinations as a whole, or the objectionable personalities of the examiners, as excuses for ignorance, carelessness, or both combined. In case you may think these strictures too severe, let me give you a few answers, taken at random, from recent examination papers. You will note that there is nothing unusual about the questions asked, nothing to be construed as a "catch question", nothing that can be construed excepting that they are fair and right and everyday questions, given in the different schools and institutions of learning, as are necessary, in order to ascertain the advancement of the student in the subjects given.

QUESTIONS IN GENERAL EDUCATION. Write a letter of not less than fifty words and not more than one hundred words, dating the letter at Saint Paul, Minesota, and addressing it to the Minnesota State Veterinary Examining Board, at Saint Paul, Minnesota. Do not refer to your political or religious opinion or affiliations, and do not use your name as a signature, but use examination number. Subject of your letter should be: "The practicability and desirability of veterinarians keeping accurate records of their cases".

ANSWER.—St. Paul, Minn, 7-11-16.

Minnesota State Veterinary Examining board,
Dear sir.

Just a few lines in regards to a patient which I have had under

my care, which I would for you to see this patient and have you give me your opinions of it I am

Yours truly

No .....

QUESTION.—What is meant by a horse power?

ANSWER.—Horse power meant by a horse pulling 250 pounds over pulley 250 ft. high in one minute.

ANOTHER ANSWER.—I cant remember.

QUESTION.—Name the capitol cities of the following states: Alabama; Connecticut; Iowa; Minnesota; New York; Oklahoma, South Carolina; Tennessee; Virginia; Wisconsin.

ANSWER.—One candidate tried to answer three, as follows: "Capitol of Alabama, Pensilvania (New York—New Jurissie)* If this candidate had not been told to report at the Capitol Building, Saint Paul, I do not know what state would have been the Capitol of Minnesota. (*Note the spelling).

Still another candidate gave Minneapolis as the Capitol of Minnesota.

Some of the candidates do not know how to spell the common terms used in veterinary practice; i. e., the word "operation", some candidates writing "opperation"; "college", one candidate writing "chollege"; another writing "catheder" for "catheter".

I will now give you a few questions and answers in other subjects:

QUESTION.—What genus of animal is subject to Johne's disease?

ANSWER.—Man, dogs, and goats.

ANSWER.—Horses, Mules, and Asses.

QUESTIONS.—Name three diseases in which you would expect to find a sub-normal temperature.

ANSWER.—Pneumonia, sun-stroke, and glanders.

QUESTION.—Locate and describe the suspensory ligament? State its function.

ANSWER.—Three of the candidates located it in the abdominal cavity, two of them stated its function is to suspend the uterus, and one stated that it suspended the whole abdominal viscera.

QUESTION.—Give average normal pulse of the horse and ox.

ANSWER.—Some gave the average pulse of the horse 45 to 50; while another gave it 60 per minute; and the pulse of the ox at 32 to 36.

QUESTION.—(a) Give the number of teeth in the horse. (b) How many temporary? (c) How many permanent? (d) At about what age is dentition complete?

ANSWER.—Some of the candidates did not seem to know that there were any other temporary teeth only the incisors.

QUESTION.—Prescribe for a horse suffering from acute indigestion.

ANSWER.— ℞ Spts Camphor
Spts Chloroform
Ol. Eucalyptus a a ℥ ii
Met. ft. sol.
Sig: ℥ i every 2 hours till pain is relieves.

℞ F. E. nux vom ℥ v
F. E. Gent ℥ viii
Aqua Q. S. ℥ xvi
Shake and give three tablespoonful on feed every three or four hours.

℞ Ol. Tenbinthniae ℥ i
Ac. Salicyli ℥ ii
Chloral ℥ iv
Spts. Vini Rect ℥ vi
Met ft Sol
Sig: Give at one dose.

QUESTION.—Write a prescription for a blister, in the form of an ointment.

ANSWER.— ℞ (A Blister)
Pot Iodide ℥ ii
Vaseline ℥ viii
Mix thoroughly.

℞ Hydrargyrum Iod Rub ℥ iii
Pulv Catharis ℥ ii
Ol. Mustard ℥ i
Misce fiat massae.

QUESTION.—What are alkaloids?

ANSWER.—Alkaloids are derivities from some medicine.

FURTHER ANSWERS.—Alkaloids are medicines in pils.

Alkaloids are agents prepared by laboratories, to be used in the treatment and prevention of diseases.

QUESTION.—Name four alkaloids.

ANSWER.—Sodii phosphate, potassi nitras, sodii chloride, potassii chlorate.

QUESTION.—What is the principal alkaloid of calabar bean and give its dose for a horse.

ANSWER.—Principal alkaloid of calabar bean Nux vomica.

Dose ℥ i to ℥ iss

ANOTHER ANSWER.—Eserine.

Dose ℥ ii to ℥ x

ANOTHER ANSWER.—Physostigmine.

Dose ℥ ii to ℥ iv

QUESTION.—What is strychnine?

ANSWER.—(a) Strychnine, it is a poison which many cause death very rudely if doses are given to large. (Note spelling, syntax, etc.)

QUESTION.—Describe its action and uses, giving hypodermic dose for horse and dog.

ANSWER.—Action of Strychnine Anodyne and stimulant. Dose sub-cut grain i to grains iii.

Dose of strychnine for dog ¼ of grain; it induces coma in the dog.

QUESTION.—Give treatment for horse suffering with tetanus.

ANSWER.—Treatment for tetanus, soft nourishing food and good cathartic—sedatives—strychnine and alcohol for the heart.

QUESTION.—(a) Give action of ergot. (b) How and where is it obtained and what contagious disease might chronic ergotism be mistaken for?

ANSWER.—(b) Ergot is obtained from ergot root by abstracting the drug from the roots by boiling. Chronic ergotism may be mistaken for rheumatism.

QUESTION.—Describe the actions of arecoline hydrobromide, and give the dose for: the horse; the cow.

ANSWER.—Dose of arecoline: Horse 1 to 2 c.c.; cow 2 to 3.

QUESTION.—Give period of gestation of mare, cow, bitch, and cat.

ANSWER.—Mare 21 days. Cow, 14 days. Bitch, 7 to 8 days. Cat, 16 days.

QUESTION.—What is sterility?

ANSWER.—Sterility means that the patient is not sterile.

QUESTION.—Describe differences between removing placental membrane from mare and cow.

ANSWER.—Remove afterbirth from mare and cow in mare the mucous membrane of uterus should be removed with the placental menbrane. (Note spelling.)

Such answers show ignorance, carelessness, and lack of reasoning power, yet all of the candidates who wrote these just mentioned believed themselves qualified to practice as veterinarians. What is most needed to raise the percentage of success in our examinations is to rid ourselves of the idea that a knowledge of veterinary science sufficient to entitle a candidate to practice it with safety to the public can be obtained in a "catch as catch can" manner. It cannot be obtained by simply putting in the prescribed time by merely attending classes in a college or university where veterinary science is taught. Veterinary science today is more complex than ever. The old order of things has changed from what it was a score of years ago. The veterinarian of today is expected, and rightly so, to be able to determine by microscope, serum, etc., to diagnose and treat diseases, thus the demands made upon students are constantly increasing and more time and study are required than ever before to meet modern conditions.

After having had such a class of men as this present themselves before the board and the board having given them reasonable opportunities to show how much they know, the board can come to no other conclusion excepting that the applicant for examination has either been admitted to a school erroneously with a lack of preliminary education to grasp the great field upon which he enters when taking up the study of veterinary medicine; or the applicant for examination before the board has not received the necessary amount of education while in school to prepare him to meet these examinations as given by state boards, when the time and opportunity present themselves.

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—Dr. J. N. L. Couture has removed from Montreal to St. Lambert, Quebec.

—Dr. J. L. Shabram has removed from Oelrichs, So. Dak., to Hartford, So. Dak.

—Dr. H. G. Wenborne has removed from Milwaukee to Wauwatosa, Wis.

# SOME ASPECTS OF THE PHYSIOLOGY OF MAMMARY SECRETION*

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I. INTRODUCTION. Since the advent of the hormone doctrine by Bayliss and Starling, in recent years many important contributions have been made to our knowledge of this subject, particularly with regard to the relationships existing between the mammary glands and the organs of internal secretion. In 1910 Ott and Scott[1] discovered that "Infundibulin" (a 20% extract of the posterior lobe of the pituitary body) had powerful galactagogue properties. Schäfer and Mackenzie[2] substantiated the work of Ott and Scott; they observed that the injection of pituitary extract into a lactating cat resulted in the secretion of milk almost immediately after the injection. Mackenzie[3], in later researches, found that this property was not restricted to sex nor even to mammals since the secretion of milk was obtained as a result of the injection of pituitary extract from birds and from male animals. Herring[4] obtained similar results from the injection of the pituitary extract of the cod.

Hammond[5] by the use of commercial pituitary extract (pituitrine) in lactating goats produced a secretion of milk, very rich in fat, which was followed by decrease below normal in the milk secreted at the next milking period.

Gavin[6] demonstrated that the use of pituitary extract to increase the secretion of milk in dairy cows was not practical from a commercial standpoint since the total amount of milk secreted per day was not increased by its use.

Hill and Simpson[7], working independently and without the knowledge of Hammond's experiments, obtained a decided increase in milk secretion in lactating goats as a result of the injection of pituitary extract. The milk thus obtained had a much higher fat content than normal milk. There was a corresponding decrease below normal in the milk secreted at the next milking period although the percentage of fat it contained was not always decreased as was reported by Hammond.

Hill and Simpson[8] next experimented upon dairy cows with

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like results. They used the saline extract of eight posterior lobes of the pituitary as one injection which was given intravenously immediately after the evening milking. The cow was milked a second time just fifteen minutes later and in one instant gave one pound of milk testing 19% of fat at this second milking while only 8.3 pounds of milk testing 7% was obtained at the normal milking just preceding. The amount of milk obtained at the next milking period was much less than normal and also contained less fat.

Mackenzie[9] and also Schäfer[10] record experiments on the effect of "pituitrine" injection in the human subject. As a result of their investigations they both have concluded that there is an increased secretion of milk following the pituitrine injection of the expense of the milk that would normally be secreted at the next milking.

Since the last mentioned authors made no effort to determine the qualitative changes in the milk due to pituitrine injection in the human subject Hill and Simpson[11] decided to investigate this point further. The subject was a young married woman nursing her second child. The milk was withdrawn with a breast pump ten minutes after the subcutaneous injection of 1 c.c. of pituitrine which was made after the evening nursing, all experiments being controlled by similar normal milkings. In all of these experiments the increase in milk secretion due to pituitrine injection was very marked as was also the increase in total amount of fat secreted. The patient could feel the milk "coming into the breasts" with a sensation between a tickle and a sting which is the same sensation that is felt when the baby begins nursing.

The following paper is an account of experiments conducted at the instigation of Dr. Sutherland Simpson to whom I wish to express my gratitude for advice and encouragement and in some instances active cooperation.

The object of these investigations was to study further the effect of pituitary extract injection on the quality and quantity of milk secreted, its mode of action, and the effect of its repeated injection upon the animal.

II. The Effect of Injections of Pituitary Extract Upon the Quality and Quantity of Milk Yielded. That the injection of pituitrine stimulates the secretion of milk abnormally rich in fat is shown by the following tables. Unless otherwise stated the injection was intramuscular, 2 c.c. of Parke, Davis & Co. pitui-

trine being used. In table No. I, goat No. II, an Angora was used. She was milked at 9 A. M., 4 P. M. and 6 P. M., the two hour interval between 4 P. M. and 6 P. M. allowed sufficient time for a sample, large enough to be analyzed, to be secreted. The injection was always made just before the 6 P. M. milking. All the injection periods are starred in the table.

TABLE No. 1, GOAT No. II.

| Date | Hour | Amount of Milk | % of Fat | Grams Fat |
|---|---|---|---|---|
| June 5th | 9 a. m. | 100 c.c. | 4.8 | 4.8 |
| June 5th | 4 p. m. | 100 c.c. | 5.8 | 5.8 |
| June 5th | 6 p. m. | 20 c.c. | 7.3 | 1.46 |
| June 6th | 9 a. m. | 175 c.c. | 4.0 | 7.00 |
| June 6th | 4 p. m. | 90 c.c. | 7.8 | 7.02 |
| June 6th | 6 p. m. | *100 c.c. | *10.5 | *10.50 |
| June 7th | 9 a. m. | 110 c.c. | 4.4 | 4.84 |
| June 7th | 4 p. m. | 95 c.c. | 5.9 | 5.60 |
| June 7th | 6 p. m. | 22 c.c. | 5.8 | 1.27 |
| June 8th | 9 a. m. | 200 c.c. | 4.6 | 9.20 |
| June 8th | 4 p. m. | 75 c.c. | 6.6 | 4.95 |
| June 8th | 6 p. m. | *90 c.c. | *11.9 | *10.71 |
| June 9th | 9 a. m. | 125 c.c. | 4.8 | 6.00 |
| June 9th | 4 p. m. | 80 c.c. | 7.2 | 5.76 |
| June 9th | 6 p. m. | 25 c.c. | 5.7 | 1.42 |
| June 10th | 9 a. m. | 180 c.c. | 4.6 | 8.28 |
| June 10th | 4 p. m. | 80 c.c. | 8.0 | 6.40 |
| June 10th | 6 p. m. | *70 c.c. | *10.0 | *7.00 |
| June 11th | 9 a. m. | 115 c.c. | 5.5 | 6.32 |
| June 11th | 4 p. m. | 85 c.c. | 6.5 | 5.52 |
| June 11th | 6 p. m. | 25 c.c. | 4.9 | 1.22 |
| June 12th | 9 a. m. | 200 c.c. | 4.8 | 9.60 |

By examining the above table it can be seen that on June 6th there were 20 c.c. of milk testing 7.3% fat secreted at the 6 P. M. milking and a total of 1.4 grs. of fat. On the following evening under exactly the same conditions, except than an injection of pituitrine was given fifteen minutes before milking, we have a yield of 100 c.c. containing 10.5% of fat making in all 10.5 grams of fat as compared with 1.4 gr. on the preceding evening. The average yield of fat for the three evening milkings when an injection was given was 9.40 grams while the average of the four normal evening milkings was 1.34 grams.

That this increase in secretion was followed by a decrease below normal at the next milking period can also be seen from the table. The average secretion of fat for the three morning milkings in which an injection was given on the preceding evening was 5.7 grams as compared with 8.5 grams on mornings that did not

follow an injection evening, or a decrease of about 3 grams of fat per day. Subtracting this 3 grams from the total gain of 9 grams we still have a net gain of about 6 grams of fat per day due to the injection.

By examining tables I to VI the increase in secretion of milk and also of fat can also be seen. The fat is known to be the most variable constituent of the milk. To determine whether or not it was the only component altered by the injections was the object of further studies. The following table in which the injection periods are starred show it to be the only one of the milk solids that is appreciably affected by the injection.

TABLE NO. II, GOAT NO. II.

| Date 1914 | Amt. of Milk | % of Fat | % of Protein | % of Ash | % of Sugar | % total Solids |
|---|---|---|---|---|---|---|
| June 2nd, 6 p. m. | 130 c.c. | 6.0 | 4.60 | .96 | 3.75 | 15.31 |
| June 3rd, 9 a. m. | 180 c.c. | 5.0 | — | .84 | — | 14.58 |
| June 3rd, 6 p. m. | 100 c.c. | 8.0 | 4.71 | .92 | 3.96 | 17.59 |
| June 4th, 9 a. m. | 165 c.c. | 4.6 | 4.05 | .91 | 3.86 | 13.42 |
| June 4th, 6 p. m. | *130 c.c. | *10.0 | *4.18 | *.93 | *3.70 | *19.61 |
| June 5th, 9 a. m. | 100 c.c. | 4.8 | 4.55 | .99 | 4.33 | 14.67 |
| June 5th, 4 p. m. | 100 c.c. | 5.8 | 4.58 | .94 | 4.10 | 15.42 |
| June 5th, 6 p. m. | 20 c.c. | 7.3 | — | .88 | — | 17.64 |
| June 6th, 9 a. m. | 175 c.c. | 4.0 | 4.45 | .90 | 4.07 | 13.42 |
| June 6th, 4 p. m. | 90 c.c. | 7.8 | 4.61 | .94 | 4.43 | 17.75 |
| June 6th, 6 p. m. | *100 c.c. | *10.5 | *4.51 | *.88 | *4.72 | *19.62 |
| June 7th, 9 a. m. | 110 c.c. | 4.4 | 4.35 | .86 | 4.58 | 14.19 |
| June 7th, 4 p. m. | 95 c.c. | 5.9 | 4.98 | .96 | 4.67 | 16.51 |
| June 7th, 6 p. m. | 22 c.c. | 5.8 | — | .88 | — | 15.92 |
| June 8th, 9 a. m. | 200 c.c. | 4.6 | 4.74 | .95 | 3.79 | 14.08 |
| June 8th, 4 p. m. | 75 c.c. | 6.6 | 4.90 | .90 | 4.01 | 16.41 |
| June 8th, 6 p. m. | *90 c.c. | *11.9 | *4.44 | *.90 | *3.74 | *20.01 |
| June 9th, 9 a. m. | 125 c.c. | 4.8 | 4.98 | .97 | 4.65 | 15.40 |
| June 9th, 4 p. m. | 80 c.c. | 7.2 | 4.74 | .85 | 3.83 | 16.62 |
| June 9th, 6 p. m. | 25 c.c. | 5.7 | — | — | — | — |
| June 10th, 9 a. m. | 180 c.c. | 4.6 | 4.58 | .82 | 4.72 | 14.72 |
| June 10th, 4 p. m. | 80 c.c. | 8.0 | 5.28 | .90 | 5.80 | 17.98 |
| June 10th, 6 p. m. | *70 c.c. | *10.0 | *5.10 | *.84 | *3.79 | *17.93 |
| June 11th, 9 a. m. | 115 c.c. | 5.5 | 4.74 | .93 | 4.80 | 15.97 |
| June 11th, 4 p. m. | 85 c.c. | 6.5 | 4.55 | .96 | 4.03 | 16.42 |
| June 11th, 6 p. m. | 25 c.c. | 4.9 | — | — | — | — |
| June 12th, 9 a. m. | 200 c.c. | 4.8 | 5.12 | .81 | 4.30 | 15.03 |

Space not permitting the use of all tables of the experiment only one is here given which is characteristic of all the others and demonstrates the fact that the fat alone was affected by the injection. Fifty-eight additional samples of milk from two other goats were completely analyzed.

That the fat is invariably increased in amount due to the in-

jection of pituitary extract is also shown in the results recorded in the following chapter.

III. The Effect of Repeated Injections of Pituitary Extract Upon the Secretion of Milk. In a previous experiment (table No. I) it was noted that when a two hour interval was allowed to elapse between injections that a decided response could be obtained at the second injection. This suggested the possibility of increasing the total daily yield by injecting at two hour intervals throughout the day. The following experiment was conducted to determine this point. Goat No. 2 was used in this experiment. She was milked at 9 A. M. and again at 11 A. M., 1 P. M., 3 P. M., and 5 P. M. following injections of 1½ c.c. of "pituitrine". The following table gives these results and shows also the after effect:

Table No. III. Goat No. II.

| Date | Hour | c.c. of Milk | % of fat | Remarks |
|---|---|---|---|---|
| June 25th | 9.00 a. m. | 130 | 5.2 | |
| June 25th | 11.03 a. m. | 57 | 9.0 | After an injection of pituitrine |
| June 25th | 1.05 p. m. | 18 | 8.8 | After an injection of pituitrine |
| June 25th | 3.13 p. m. | 14 | 5.8 | After an injection of pituitrine |
| June 25th | 5.16 p. m. | 14 | 5.8 | After an injection of pituitrine |
| June 26th | 9.00 a. m. | 70 | 5.3 | No injection given |
| June 26th | 6.00 p. m. | 100 | 5.1 | No injection given |
| June 27th | 9.00 a. m. | 150 | 5.9 | No injection given |
| June 27th | 6.00 p. m. | 90 | 6.2 | No injection given |

As can be seen from the table the usual increase in milk and fat was obtained at the 11 A. M. milking. At the 1 P. M. milking there was very little if any gain due to the injection, likewise after the injections at 3 P. M. and 5 P. M. there was no increase in milk secretion and the milk was no richer than usual. This leads to the conclusion that the mammary gland of an animal cannot respond with a liberal secretion of milk to any more than one injection of pituitrine given at two hour intervals.

Thinking that perhaps the repeated injections of pituitrine might alter its action upon the mammary gland or that a tolerance for it might be established, we continued our injections over a prolonged period and observed that an apparent tolerance was established in each goat. (Simpson and Hill[12]).

The goats were bred and taken to a farm for the winter. Shortly after their kids were born in the spring we resumed our investigations but found, somewhat to our surprise, that the tolerance established the preceding lactation period had entirely dis-

appeared and they were as responsive to the action of pituitrine as they had ever been. We injected at regular two week intervals through the entire lactation period to see if a tolerance would again be produced. The following tables and protocols give the results of this work.

The first experiment was started while the goats were still on pasture and were suckling their kids. They were milked while in the pasture, care being taken to remove all the milk possible from the gland. Immediately after milking they were injected with 2 c.c. of pituitrine and ten minutes later milked again. The results are given in the subjoined table. It must be borne in mind that both of these goats had established a tolerance for pituitrine at the preceding lactation period.

TABLE NO. IV.

| | GOAT NO. I | | | | GOAT NO. III | | | |
|---|---|---|---|---|---|---|---|---|
| | Before Inject. | | After Inject. | | Before Inject. | | After Inj. | |
| | cc milk | % fat | cc milk | % fat | cc milk | % fat | cc milk | % fat |
| May 10 | 22 | 8.3 | 63 | 9.7 | 30 | 6.8 | 100 | 8.3 |
| June 1 | 25 | 7.4 | 190 | 9.7 | 45 | 6.4 | 130 | 8.2 |
| June 14 | 25 | 9.4 | 60 | 10.4 | 30 | 7.8 | 73 | 9.0 |
| Average yield | 24 | 8.4 | 104 | 9.9 | 35 | 6.9 | 101 | 8.5 |
| Grams fat yielded | | 2.0 | | 10.3 | | 2.41 | | 8.58 |

Since there was an average yield of 2.0 and 2.41 grams of fat from the milk obtained from the normal milkings in goat 1 and 3 respectively, while an average of 10.3 and 8.5 grams of fat were obtained immediately afterwards as a result of pituitrine injection, there can be no doubt that all previously reported tolerance for pituitrine had entirely disappeared. Table No. 5 gives the results of the continuation of this experiment on goats No. 1 and 3.

TABLE NO. V.

GOAT NO. I

| Date | Before Injection | | After Injection | | Per cent of Increase | |
|---|---|---|---|---|---|---|
| | c.c. of milk | % of fat | c.c. of milk | % of fat | Total amt. of milk | Total amt. of fat |
| June 23 | 150 | 8.0 | 100 | 13.6 | 67 | 113 |
| June 29 | 195 | 8.6 | 43 | 12.6 | 22 | 39 |
| July 6 | 130 | 9.4 | 25 | 11.4 | 19 | 28 |
| July 13 | 165 | 8.8 | 55 | 13.9 | 33 | 53 |
| July 21 | 145 | 9.4 | 30 | 13.6 | 21 | 30 |
| July 27 | 120 | 8.7 | 45 | 11.4 | 37 | 50 |
| Aug. 3 | 105 | 8.8 | 40 | 11.8 | 48 | 51 |

GOAT No. III

| Date | Before Injection | | After Injection | | Per cent of Increase | |
|---|---|---|---|---|---|---|
| | c.c. of milk | % of fat | c.c. of milk | % of fat | Total amt. of milk | Total amt. of fat |
| June 23 | 135 | 8.2 | 135 | 14.2 | 100 | 173 |
| June 29 | 120 | 9.8 | 45 | 12.2 | 37 | 42 |
| July 6 | 75 | 8.8 | 35 | 11.3 | 47 | 60 |
| July 13 | 110 | 7.6 | 45 | 12.0 | 41 | 65 |
| July 21 | 95 | 6.6 | 65 | 13.0 | 69 | 119 |
| July 27 | 80 | 11.2 | 40 | 12.5 | 50 | 56 |
| Aug. 3 | 25 | 11.0 | 25 | 14.2 | 100 | 129 |

The goats were milked regularly at 9 a. m. and 6 p. m., and on days when injections were given they were milked at 6 p. m. and immediately afterwards injected with 2 c.c. of pituitrine and ten minutes later milked again. These milkings were always controlled with normal milkings when the same procedure was adopted except that no injection was given.

Hammond (loc. cit.) states that the mammary gland is more responsive to the action of pituitrine in early than in late periods of lactation. Our goats seem to give the best results soon after kidding but as table No. V shows there is no regular correlation with the period of lactation.

Goat No. I during our first experiments upon her, ([7]) responded to pituitrine injections until she was practically "dry". During this period a comparatively large amount of pituitary extract was given. She was bred and soon after freshening again the injections were resumed but without any positive response from her throughout the entire lactation period ([12]) although other goats responded positively when given the same extract. Why she should again respond so positively after once establishing an apparent tolerance for the extract is not clear.

Not wishing to confine our experiments to Angora goats which are normally poor milkers a half breed Toggenburg milking goat was obtained. Exactly the same procedure was adopted as was used in the preceding experiments. The following table gives the results of these injections. The injection periods were always controlled by normal milkings but to avoid unnecessary tables these are not given. The amount of pituitrine injected was always 2 c.c. given immediately after milking and followed in ten minutes by a second milking.

TABLE No. VI, GOAT No. IV.

| Date | Before Injection | | After Injection | | Per cent increase | |
|---|---|---|---|---|---|---|
| | c.c. of of milk | % of of fat | c.c. of of milk | % of of fat | tot. amt. of milk | tot.amt. of fat |
| Oct. 30th, 9 a. m. | 480 | 5.6 | 80 | 8.2 | 17 | 21 |
| Nov. 1st, 9 a. m. | 385 | 2.8 | 150 | 6.2 | 39 | 86 |
| Dec. 14th, 9 a. m. | 280 | 7.2 | 65 | 8.8 | 23 | 28 |
| Dec. 14th, 6 p. m. | 60 | 7.0 | 44 | 8.6 | 73 | 90 |
| Dec. 16th, 9 a. m. | 300 | 6.2 | 100 | 8.4 | 33 | 45 |

This table also shows great lack of uniformity and no direct correlation to the period of lactation. This goat never responded to the injections with the same degree of positivity that was shown by either of the other goats.

Cushing has shown that the feeding of pituitary bodies to growing dogs results in emaciation. Our goats toward the end of the third lactation period in which pituitary extract had been used began to fail in health. This was first noticeable in goat No. III. Whether or not this was due to the use of pituitrine I am unable to state. One would hardly think the amount we used was sufficient to undermine the health of the animals. During the entire period of 1915 goat No. III was not in prime condition and toward the latter part of the period about August she became emaciated and at times appeared in considerable pain. She was then on pasture but in addition was receiving all the hay and grain she would eat. In spite of this treatment she continued to weaken and on Dec. 20th died. A post mortem examination revealed a pulmonary infection of verminous bronchitis due to *Dictyocaulus filaria*, a parasitic disease quite common in goats and frequently fatal. Unfortunately the other organs were not examined.

Goat No. I was apparently in good health until about December 1st when she also started to lose in flesh. Her symptoms were similar to those experienced by Goat No. III except that she did not appear to suffer pain. Loss of appetite was one characteristic symptom but she also became stupid and sought seclusion and would spend most of the time lying down in some protected corner. She gradually wasted away and died in March. We thought that she had died of the same infection as Goat No. III but a post mortem examination proved otherwise. There was no pulmonary infection or any other evidence of *Dictyocaulus* infestation, but according to Dr. Goldberg, to whom I am indebted for the examination there was a marked degeneration of the pancreas and also of the

islets of Langerhans. The kidney also showed evidence of degeneration. These were apparently the only abnormalities that could have caused death. It is to be regretted that the pancreas of goat No. III was not also examined since with only this one example we would not be able to state whether or not the pituitrine injections were responsible for the degeneration noted.

IV. The Mode of Action of Pituitary Extract on the Mammary Glands. There are three ways in which pituitrine might act in causing milk secretion. I. Because of its well known action on the arterioles causing their constriction, the blood supply to the mammary gland might be altered resulting in milk secretion. II. The action of pituitrine may be glandular in nature, the secretory epithelium lining the alveoli being stimulated by its use resulting in milk secretion. III. Many histologists believe that the alveoli contain in their wall plain muscle fibres capable of contracting and forcing out the milk contained within the lumen. If this is true pituitrine might act on these muscle fibres thus forcing out the residual milk that would not otherwise be removed by ordinary hand milking.

Mackenzie[9] has shown that the first injection of pituitrine causes a secretion of milk accompanied by an increase in blood pressure while a second injection given one-half hour later is followed by milk secretion and a decrease in blood pressure. These facts would seem to be sufficient to disprove the first mentioned theory.

The two remaining theories are well worth considering; there seems to be good evidence for each theory and as yet I do not consider either to be conclusively proven.

Schäfer[14], from histological evidence, has come to the conclusion that the action is muscular. Gaines[15] from physiological experimentation has arrived at the same conclusion.

Hammond[5] from his extensive researches upon this subject is of the opinion that the action is glandular rather than muscular. Simpson and Hill[16] have also produced good evidence that it is not muscular. Experiments were performed on two lactating dogs. They were anesthetized and an incision was then made into one of the mammary glands (the right of the posterior pair). The milk was led off to a drop recorder by a strand of lampwick placed in the incision, according to the method adopted by Schäfer and Mackenzie[2]. The drops were recorded on a moving kymograph and at the same time the blood pressure tracing from the right carotid artery was taken with a mercurial manometer.

With milk flowing regularly at the rate of one drop in fifteen seconds an injection of 1 c.c. of a 1% solution of barium chloride (a powerful stimulant for plain muscle) was made into the left femoral vein. This was sufficient to produce a distinct rise in blood pressure and a slowing of the heart rate but decreased rather than increased the secretion of milk in each experiment.

An injection of pituitrine after an interval of three or four minutes produced a decided flow of milk especially in experiment II in which the dog was newly lactating.

Since pituitrine stimulates milk secretion when injected three minutes after an injection of barium chloride it would seem evident that its action is not muscular. The criticism has been offered ([14]) that barium chloride may not be a stimulant for the muscle fibres in the mammary gland. Barium chloride is usually considered a stimulant for all "plain muscle" and has not been proven otherwise.

I have in mind a human subject who is nursing her third child. She is suffering from vaso-dilation and to tone up her blood vessels is taking twenty drops of ergot three times a day. After taking this dosage there is no secretion of milk nor any sensation that is associated with the secretion of milk. During a previous lactation period ([11]) this patient was given injections of pituitrine and never failed to secrete a copious supply of milk and experience a characteristic sensation in the breasts as a result of the injection. The action of ergot on plain muscle is also well known.

As has been previously stated pituitrine has an immediate excitatory effect which is followed by a decreased secretion below normal at the next milking period. Lactating goats that have ceased to respond to its galactagogue action giving no increase in milk secretion as a result of its use, still show a decrease below normal in the amount of milk secreted at the milking period following the injection. This would indicate an inhibitory action of the extract. Since there was no milk secreted as a result of its use the decrease observed at the following milking could not have been due to the withdrawal of milk that would have been obtained later.

The following table No. VII shows this effect in goat No. I: the injection was always two cubic centimeters of Parke, Davis & Co. pituitrine given subcutaneously immediately after the evening milking.

TABLE NO. VII, GOAT NO. I.

| Injection given immediately after evening milking | | | | | | |
|---|---|---|---|---|---|---|
| Date | Evening Milk | | | | Next morning's Yield | |
| | Before inj. | After inj. | Total | % Fat | c.c. of milk | % of fat |
| July 15th | 40 c.c. | 5 c.c. | 45 c.c. | 7.8 | 50 c.c. | 6.8 |
| Oct. 1st | 28 c.c. | 2 c.c. | 30 c.c. | 8.3 | 45 c.c. | 8.8 |
| Oct. 16th | 25 c.c. | 4 c.c. | 29 c.c. | 9.5 | 30 c.c. | 8.3 |
| Oct. 20th | 20 c.c. | 2 c.c. | 22 c.c. | 9.7 | 25 c.c. | 8.4 |
| Average | | | 31 c.c. | 8.8 | 37 c.c. | 8.1 |
| Control milkings no injection given | | | | | | |
| July 14th | 45 c.c. | 4 c.c. | 49 c.c. | 7.8 | 85 c.c. | 7.5 |
| Oct. 2nd | 30 c.c. | 1 c.c. | 31 c.c. | 8.2 | 45 c.c. | 7.6 |
| Oct. 17th | 20 c.c. | 1 c.c. | 21 c.c. | 8.6 | 40 c.c. | 9.8 |
| Oct. 19th | 20 c.c. | 2 c.c. | 22 c.c. | 9.1 | 35 c.c. | 10.9 |
| Average | | | 31 c.c. | 8.4 | 51 c.c. | 9.4 |

On the four evenings when injections were given there was an average of 2.72 grams of fat secreted compared to 2.62 grams on the control evenings—an increase of only .10 gram per day which would have probably occurred without the injection. The average fat yield for the four mornings following the injections was 2.99 grams while the average yield obtained on the four mornings not preceded by an injection was 4.79 grams. There was an increase of only .10 gram and a decrease of 1.80 grams daily as a result of the injection, the decrease being fifteen times the increase.

The following experiment was undertaken to determine the effect on the next morning's yield of an evening injection of pituitrine without the subsequent removal of milk. The subject was a lactating goat No. IV. She was milked regularly at 5:30 P. M. and 9:30 A. M., and the injection of Parke, Davis & Co pituitrine (2 c.c.) given subcutaneously immediately after the evening milking. Table No. VIII, shows the results of these injections the morning following an injection period being starred.

TABLE NO. VIII, GOAT NO. IV.

| Date | Morning Yield | | Evening Yield | | Remarks |
|---|---|---|---|---|---|
| | c.c. milk | % fat | c.c. milk | % fat | |
| Jan. 17 | 310 | 4.8 | 160 | 6.0 | |
| Jan. 18 | 350 | 5.8 | 155 | 6.4 | |
| Jan. 19 | *275 | 6.6 | 170 | 5.8 | *Inj. of pituitrine on previous evening |
| Jan. 20 | 350 | 5.8 | 150 | 4.0 | |
| Jan. 21 | *260 | 7.4 | 175 | 4.6 | *Inj. of pituitrine on previous evening |
| Jan. 22 | 300 | 5.8 | 155 | 4.6 | |
| Jan. 23 | *350 | 6.8 | 140 | 7.0 | *Inj. of pituitrine on previous evening |
| Jan. 24 | 345 | 6.4 | 150 | 4.7 | |
| Jan. 25 | *250 | 7.3 | 200 | 4.0 | *Inj. of pituitrine on previous evening |
| Jan. 26 | 320 | 6.0 | 165 | 6.0 | |
| Feb. 22 | 360 | 6.5 | 225 | 7.0 | |
| Feb. 23 | 375 | 6.5 | 265 | 7.3 | |
| Feb. 24 | *275 | 6.6 | 245 | 7.3 | *Inj. of pituitrine on previous evening |
| Feb. 25 | 385 | 6.3 | 185 | 6.7 | |
| Feb. 26 | 300 | 6.5 | 175 | 6.9 | |
| Feb. 27 | *290 | 7.3 | 150 | 7.0 | *Inj. of pituitrine on previous evening |
| Feb. 28 | 335 | 6.2 | 190 | 7.2 | |
| Feb. 29 | 370 | 7.2 | 220 | 6.6 | |
| March 1 | *350 | 5.7 | 200 | 6.0 | *Inj. of pituitrine on previous evening |
| March 2 | 390 | 5.2 | 230 | 5.4 | |
| March 3 | 420 | 5.0 | 250 | 5.6 | |
| March 4 | *385 | 4.5 | 250 | 5.2 | *Inj. of pituitrine on previous evening |

By examining this table it can be seen that there is almost invariably a decreased secretion of milk on the mornings following an injection although no milk was withdrawn after the injection. The average secretion of milk on the mornings following injection was 304 c.c. while an average of 351 c.c. was secreted on the other mornings, an apparent loss of 47 c.c. of milk per day due to the injection. These results are difficult to explain if we assume the muscular theory to be correct.

V. SUMMARY AND CONCLUSIONS. I. The injection of pituitary extract into lactating animals produces an immediate secretion of milk even though the mammary gland was hand milked just preceding the injection.

II. The milk secreted as a result of pituitary injections has a super-normal fat content but the amount of milk and usually, but not invariably, the fat it contains is decreased at the next milking period. The total daily secretion of milk is only slightly altered by the injection of pituitary extract; there may be either a slight gain or a loss in the total amount secreted.

III. The mammary gland of a goat does not respond to more than two injections of pituitrine given at two hour intervals.

IV. If the injections of pituitary extract is continued for a sufficiently long period a temporary tolerance for its action on the mammary glands may be established. This tolerance may entirely disappear by the next lactation period.

V. Similar results have been obtained by the injection of pituitary extract into lactating cats, dogs, goats, cows and the human subject both as to the quantity and quality of the milk secreted and the rapidity of the response to the injection.

VI. There seems to be good evidence in support of both the glandular and muscular theories of the action of pituitary extract on milk secretion, the results of my researches would, however, lend themselves more to the support of the former theory.

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—Dr. J. R. Grigsby has removed from Ft. Collins to Wray, Colo.

—Dr. W. J. Stewart has removed from Oakland to Berkeley, Calif.

—Dr. V. W. Knowles of Marshalltown, Ia. has been transferred to Little Rock, Ark., in the service of the Bureau of Animal Industry.

—Dr. H. C. McKim, formerly of Pasadena, Calif., is now stationed at Remount No. 2, Fort Sam Houston, Texas.

—The address of Dr. Robert Graham of Lexington, Ky., will be changed to Urbana, Ill. after September 1.

—The next meeting of the Connecticut Veterinary Medical Association will be held August 8, at Lake Compounce, Bristol, Conn,

# ITEMS IN RECENT HISTORY OF VETERINARY MEDICINE*

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(*Continued from page 526*)

*Cases in Which Slaughter is Commendable.* Even in the mild and non-lethal foot and mouth disease there are cases in which slaughter is imperative, as when infected stock has just been landed in a country that has been, and still is, free from this disease as regards its home herds. When a whole nation is threatened by a probable, prospective escape of the infection through winds, water, birds, insects, and vermin in addition to the grosser methods of transmission, prompt killing followed at once by complete sterilization, preferably by heat, is by far the best and safest course. Prophylaxis by the absolute exclusion of all animals susceptible to a given dreaded disease is still better. The age-long example of the Channel Islands is a lesson to the world which every country may well study and adopt. The unconscious exclusion of foreign stock by the Scottish Highlands, and other lands, is no less instructive. For a land infected only in a very limited area and where this has been, and can still be, completely isolated from surrounding territory, it may still be the wisest course to ruthlessly *stamp out* the disease in this way. But when the infection is spread over a wide area when the number of animals to be sacrificed is large, where the owners hold them at a sentimental value rather than a market valuation, where the government valuation is unduly low, and where the animals are yielding a large income to their owners that will be cut off when they are killed, compulsory slaughter is usually a serious tactical blunder and will bid fair to defeat its own purpose.

*Mistakes of the Federal Government in the Last Three Great Outbreaks.* This has been the error of the Federal Government in the three last invasions. In that of 1912 the exact source of infection was never certainly ascertained. There was evidence to show, however, that it had reached Boston in cow-pox virus imported from a country affected with foot and mouth disease. Dr. Tizzer of Boston in 1902, obtained from a biological laboratory

in Massachusetts some vaccine to raise cow-pox on a calf, but found to his surprise that the calf developed foot and mouth disease instead. The vaccine bore labels showing that it had come from Japan, where foot and mouth disease prevailed, and subsequent experiments later in another part of Massachusetts led to an identically similar result. There is therefore no reason to doubt that this was the real source of infection. The two diseases agree in that both developed on the skin a vesicular eruption, both have their seat of election on the skin, in the same genus of animal, they have almost the same period of incubation, the same duration, the same mild course and rapid recovery, and the same habitual absence of evil consequences. They can be easily produced simultaneously in the same system, and the inoculation of the serum from a vesicle will produce one disease, or the other, according to the stronger susceptibility of the particular subject. The malady had been smoldering in Boston and environs for a length of time (since July) but was only recognized by the Federal and State officials in November. It had, however, been long enough neglected to have extended widely in Massachusetts, Vermont, New Hampshire and Rhode Island. A rigorous compulsory slaughter and disinfection were put in force and the disease was finally extirpated in May, 1903. The dairymen who had been concealing the disease for a length of time before its official discovery were even more disinclined to report it under the rigorous measures adopted, and there were extensive losses in the herds, closely shut in with their manure, in close, often filthy buildings, so that complex infections were the rule, with *foot rot, ulcerated teats, mammary abscesses,* and *other infective troubles,* so that the owners lost heavily, and were finally glad to part with their cows on any terms. It was a repetition of the losses sometimes suffered in confined, unwholesome cowsheds in the large cities of Europe, usually cut short by a final surrender of the stock to the government. A more rational system, with a better hygiene for the cows, would have shown the normally mild disease, and greatly reduced the complexity and violence of the attacks. We would then have had an experience, the counterpart of the pest of 1870. The actual loss to the country in indemnities paid for diseased cattle when discovered would have been saved as a whole; in the absence of concealment there would have been little, if any, complexity in the infections and *pari passu* a correspondent absence

of complex and intractable diseases which in the concealed and closely confined animals caused loss of condition, milk, health, and permanent ruin of all that made them valuable for the dairy. The animals would have continued to bear a good and substantial value instead of having become worthless as well as dangerous. The very season (winter) was especially propitious, as it was in 1870. As it was, the outbreak lasted six months after discovery (ten months according to some stockmen and veterinarians, with a complete sacrifice of all infected and exposed dairy stock, and a complete demoralization and ruin of the milk trade for that length of time.

The invasion of 1908 manifestly came from a similar source. Its origin, at first enveloped in obscurity, was, by the admirable investigation of the Bureau of Animal Industry, from the books of record of the Buffalo Stockyards, showing the animals that had occupied the yards from which the infecting animals had been sent to Pennsylvania and New York herds, and, from the railway books and waybills, the sources from which all of these animals had been started by rail to Buffalo, and the shippers at such starting points, finally traced to a Michigan farm, where the first to suffer were a lot just returned from a biological laboratory where they had been hired for laboratory use. Here, as in Massachusetts in 1902, it was evident that the materials used in the laboratory manipulations had conveyed the *foot and mouth disease*. The delays, however, had given ample time for the diffusion of infection, had conditions been favorable. The first reliable report of the disease came from Dr. Pearson, State Veterinarian of Pennsylvania, November 9th; the first cases of visible disease in New York herds were seen by me November 16th, and the first clear evidence of the disease in Michigan reached us November 22nd. Inquiries in Michigan developed the fact that the herd first affected (reported) had had its disease diagnosed as *mycotic stomatitis* and as they must have been *apparently* recovered before they could be shipped to Buffalo at least two weeks or more must be added beside the time they spent in the laboratory. We have thus at least 34 days clearly accounted for during which the infections could have spread, since the history of the outbreak begins. Shipments by rail, in the interval, could be easily traced, but the one to Pennsylvania was alone in evidence. This latter was already traced by waybills to Northumberland, Montour and Lucerne Counties and had been taken care of.

There might still of course be infection from the highways over which they had traveled, but even this could be watched under quarantine. In New York the railway books and waybills showed nothing so that there was a probability that the missing cattle from the Buffalo stockyards had gone by highway, and this turned out to have been the case when they were hunted down in nearby counties. Here again, however, possible infection from the highways confronted us. County by county was quarantined wherever infection was discovered, suspicious cases outside the quarantined territories were carefully investigated, and the disease was safely circumscribed and extirpated before the end of the year. Several New York herds, that had escaped detection until they had passed through the disease and recovered, were saved from slaughter and kept rigidly shut up in their yards until there was no longer any danger, and at last liberated after thorough disinfection. It seemed a foregone conclusion that in this outbreak Ohio must necessarily become involved, as Michigan cattle are largely drawn into this corn-growing state for winter feeding. But the high price of corn led the Ohio farmers to turn their corn into money direct, and abandon winter feeding for that year, and thereby the state was saved from the plague.

The suppression of the *first* of these invasions (1902) cost the invaded states (Massachusetts, Rhode Island, Vermont, and New Hampshire) in compensation for animals killed $119,917.00, beside the heavy outlay for professional supervision, disinfection and the many incidentals. The second for the three states (Michigan, Pennsylvania, New York and Maryland), cost in compensation for the slaughtered, $90,033 and including supervision and needful outlays $300,000.

A *third* invasion (1914) covered a much wider area, having reached 21 states and the District of Columbia. Its real origin has not been demonstrated. The Secretary of Agriculture thinks it may have been imported in a material used in a tannery at Niles, Mich., where the disease was first reported, and repeats a rumor to the effect that pigs belonging to employees of this tannery were the first sufferers. Had he named the suspected "*Material*" it might have given some color to the suspicion, but by omitting this he leaves his theory no better than a guess. It is perfectly true that fresh hides, or other part of an infected animal, or a hide that has been closely packed while yet green, could easily carry the virus. But

when he has not bestirred himself to secure prohibition of the importation of such obvious *fomes* we are left with the management of the disease which had sneaked in unawares at the opening we had so invitingly left for it. In August 1914, local veterinarians in Cass and Berrien Counties were dealing with a disease which they recognized as suspicious, and toward the end of that month they reported this affection to the State Veterinarian. The state official in his turn consulted a meat inspector of the Bureau of Animal Industry, at Detroit, and September 3rd, went with him to Niles to see the cases. They failed to diagnose these correctly, but sent some scrapings to the B. A. I. pathological laboratory at Washington. This laboratory failed to reach a satisfactory conclusion and temporarily adopted the diagnosis of *mycotic stomatitis.* September 24th the pathologist of the State Live Stock Sanitary Commission visited an infected farm and two days later, in company with the State Veterinarian, several other infected farms in the neighborhood. The pathologist now suspected foot and mouth disease and suggested telegraphing to Washington to send an expert. The State Veterinarian preferred to confine their inquiries for the present to the local office of the B. A. I. at Detroit. The pathologist took the specimens to Lansing and September 28th inoculated a calf. On October 1st this calf showed all the buccal lesions and symptoms of foot and mouth disease, but they still hesitated because the feet were not involved. On October 5th the State Veterinarian, the president of the State Live Stock Sanitary Commission, and the inspector in charge of the office of the B. A. I. at Detroit went once more to the diseased herds in Berrien County and the inspector now sent to Washington *a letter* describing the symptoms, which was received at the B. A. I. October 10th. The Bureau, which three weeks earlier had concluded from the examination of some scrapings that the disease was *mycotic stomatitis,* now woke up to the serious nature of the affair, inoculated some calves and sent an expert in haste to Niles. He decided at once on foot and mouth disease, but to support his diagnosis he inoculated some calves, which in due time showed the characteristic disorder.

The apathy, tardiness and lack of promptitude shown by the State Veterinarian, and the B. A. I. inspector when the national calamity loomed up before them is rather incomprehensible. The milk from the diseased cattle had been sent to creameries, where hogs were fed on the skim milk and sold in the Union Stock Yards, Chicago,

and from there to other destinations. It should surprise no one that when the B. A. I. inspectors got on the scent (October 17th) they found 46 infected herds in the suspected district around Niles. By October 28th the Secretary got around to the infected Union Stock Yards and promulgated a quarantine to take effect three days later (October 31st). An excellent measure to hurry out all infected and diseased animals to form newer and wider and more effective centers of multiplication and spread of infection before the gates were closed. Hay was included in the earlier quarantine, but by November 7th, the thoroughness and efficiency of the order must be again impaired by allowing the movement of hay which was allowed if cut before August 1st, on affidavit of the owner or consignee. Even hides and skins from the quarantined area, can be moved interstate when accompanied by an affidavit showing that they had been removed from the body before August 1st, 1914 (the *assumed* date of the 1st case), while foreign hides and skins can be moved interstate but must be accompanied by an oath in the same way. This is akin to the rules in Europe to prevent the movement of infected cattle and things. Such rules were overridden whenever a burgomeister (a layman) judged it safe to relax them, and the meat from suspected or even diseased animals was admitted to the *freibank* or other low-grade market when the head and feet had been removed. Even in England quarantined animals were allowed to pass over the public highways to slaughter, when the local inspector, often a policeman or other non-professional person, granted the privilege. It was from the experience of these lands, that we had adopted the absurdity that this disease could not be controlled by quarantine (See Author's "*Report to the Commission of Agriculture of the State of New York,*" *for 1910, pp. 303-326*). We flatter ourselves that in this enlightened age we take science, reason and judgment for our guides, but man is still too apt to forget all three, when the unscientific past is in authority, though such authority is antiquated and should be abandoned.

The compulsory cessation of all movement from herd to herd, or from place to place, making this cover a sufficiently wide area, the exclusion from the quarantined place of all animals and men, from outside, who might carry infection, including all birds, vermin and flies, the shutting in of all products of animals susceptible to the disease until sterilized, and the suspension of all intercourse of human beings inside the quarantine and those outside, will and

must stop all infection and speedily stop all reproduction of the infecting material. This quarantine must be thorough and effective; there can be no relaxation nor exceptions; everything must bend to the absolute necessity of the extinction of the germ. Efficiency depends on thoroughness and no rule on paper only, however widely posted and glaringly displayed, can meet the case unless rigidly applied both in spirit and deed. It need not be long continued in this disease, if applied in force and firmness, so that there is no serious outlay nor loss, and what little loss there is, is overcompensated in the saving of affected herds and its speedy restoration to usefulness and profit.

The greatest error of our American sanitary administration in this malady is in the *compulsory slaughter*. As we have already seen, *compulsory slaughter* has its proper place, and is indispensable when needed, but as an uniform system, in a widely distributed outbreak, it has proved a failure. It does not take sufficiently into account the effect on *human nature*. All stock owners are not necessarily philanthropists, nor even patriots of a socialistic type, who are ready to suffer heavy personal loss for the good of the community and nation. They see that this disease is neither fatal nor prolonged, that all recover and almost all are restored to usefulness, and in their recovery there has been secured for each an immunity for five months at least, so that they run no danger of a second attack, that the fodder and litter laid in for winter use can still be fed to *them* instead of sacrificed like themselves and all their prospective progeny. Need we wonder that such owners should look upon the killing as an altogether unnecessary loss, not present alone, but going on into the distant future as well. If the owner has been building a herd of special animals, it may be of a high breeding value, but certainly precious in their proven adaptability to the needs and demands of critical and exacting customers, to the management, food and water of which he is himself trained to supervise, when the owner has been at much trouble and expense to eliminate from the herd diseases that would disqualify their victims for use in the dairy, need we wonder if he resents the whole unreasonable procedure, that a disposition to revolt arises in his mind, that he should be tempted to conceal his infected cows through the few days of real illness, and preserve to his family the living that he has been at great pains to build up. It cannot be answered that the killing of one animal is to save the remainder of his herd,

for in this disease the infection of one means almost of necessity the infection of every animal in the herd. It cannot be said that the infection cannot be confined to the one herd, for all experience has shown that in different premises where *isolation* is assured the virus need not be carried from one to the other. On the Scottish farms already quoted there was the invariable experience that a reasonable seclusion was always successful. *Compulsory slaughter* is an economy in the case of a herd imported and only just landed in a plague-free country, but where foot and mouth disease has already become widespread and the citizens of many states have to be persuaded to yield up their property, their source of living, and their attached and well satisfied customers, whom they could count on for continued support it is different. *Compulsory slaughter* is an untactical and impolitic resort, which cannot fail to make antagonistic a large body of citizens whose conciliation is the surest road to success. That it has aroused the opposition of a large number of citizens is undeniable, in each of the three last outbreaks, and that that opposition has led to a prolonged duration of the epizoötic and an altogether unnecessary outlay is as clear. During the campaign against the disease it would have been impolitic to say this; it would simply have increased the confessedly great dissatisfaction, and any practical movement against the wrong even if successful, could but have hampered the officials who had the *legal* right and duty to act, and delayed the extinction of the disease and deliverance of the country from the impending calamity of a general infection. The duty of dealing with it was reposed by Congress in the Department of Agriculture, the mistaken and wasteful courses which this department followed would succeed in the long run if it could be maintained, but only at the cost of a prodigal outlay of money, and the undermining of much of that loyalty on which the life of the nation depends. Now the case is different; we are informed that the plague has been exterminated, after a fight of two years instead of a career of a little over two months in 1870 when left to the good will and purpose of the stockowners, and at a cost spoken of as several millions indemnity in addition to the permanent sacrifice of many very valuable breeding cattle and their otherwise prospective progeny.

The whole herd cannot always be saved. The animals with irremediable and chronic, necrotic deposits internally must still be sacrificed for the common good, and many epithelial growths must

be excised or otherwise disposed of and their bases sterilized. Here as elsewhere the work must be radical so as to make a complete end of possible infection. Many parasitisms will also require remedies, or, if beyond this, the hosts may have to go to the block. But let it once more be urged that the preservation of the present and future bovine animal must never be taken as a license for the slightest shadow of laxity in the quarantine. The stock in the quarantine area must be entered in a census with ages, breed, markings and other indelible means of identification, and kept under heavy penalties away from public highways, and exposed lots, the herd to be forfeited if any one is missing or if quarantine is violated in any way. Conciliation for the law-abiding, and punishment severe and unfailing for the violator is the price of success.

Hog Cholera. No *animal plague* is more widely spread in the United States than *hog cholera.* No one takes yearly a heavier toll of deaths from our food-producing animals, and I may say none is more familiar to the farmer of the middle west, and none more dreaded. We can find suggestions of its existence in Europe centuries ago but only in the indefinite form of a *fatal epizoötic in swine.* The lack of identification may be explained on the ground that swine diseases received little attention as compared with the plagues of the more valuable domestic animals; veterinary medicine was very crude and uncertain; swine listed as unclean in the Jewish code was anything but a favorite, even with the Christian, and was comparatively seldom bred and kept in large herds. In 1817 swine suffered under a deadly epizoötic in Great Britain which cannot, however, be clearly identified. Fifteen years later such scourges were common—the swine industry had grown to much greater dimensions. It was said to have been exported in 1832 to America where the pork industry was much more in vogue, and since then it has been a constant pest. At first it was rated as a single disease and was referred to under a variety of names,—*measles, erysipelas* (*red disease, rouget, Rothlauf, scarlatina*), *purples* (*blue sickness*) *carbuncular fever, typhoid fever, pig typhoid, typhus, gastro-enteritis, diphtheria, cholera,* etc.

The *swine erysipelas* was the first to be distinctly set apart on account of the extreme redness of the skin, and, on the advent of bacteriology the distinction was endorsed by the discovery of the constant presence of its straight, non-motile, bacterium quite unlike the *actively motile bacillus* of what is now called *hog cholera.* This

last was discovered by D. E. Salmon and Theobald Smith and long accepted as the pathogenic cause. Smith distinguished seven varieties from different outbreaks of varying virulence and severity. Then came the discovery by Loeffler and Schütz of the non-motile, minute, *Bacterium of Schweinseuche* in the *pneumo enteritis* in which the lungs especially suffer. It must be added that M'Fadyean found the motile bacterium having the pathogenic characteristics of the hog cholera germ and the cultural features of the *pneumo enteritis* one; also that Reitsch and Jobert in a hog cholera outbreak at Marseilles found a bacillus longer and thicker than the hog cholera germ, staining in poles and souring and coagulating milk. Thus we had a dozen different microbes representing a dozen different infections and maladies that had formerly been classed as one. Then came Dorset, Cotton and McBryde with the demonstration of an invisible, filterable germ which escaped through both the Pasteur and Berkfeld filter, yet proved more certainly infectious, and caused more redoubtable lesions than did the already recognized germs found in that disease. This, however, still failed to close the list. In certain characteristic outbreaks there were constantly found the *spirochete* making a full baker's dozen of different infections without counting complex cases in which two or more of these germs were present at once, and those in which still other different germs must be admitted as complications. It is now generally understood that the ultravisible organism is the most important pathogenic agent of the whole. This should be borne in mind when we come to consider the prophylactic measures in current use.

The *spirochete* is set down as a *protozoan* instead of a *bacterium*, and may, like some of that class, be closely related to the ultramicroscopic and *filterable germs*, so that the recognition of its occasional presence may serve to reduce, in place of increase, the number of real pathogenic organisms, to simplify instead of further complicating the problem in hand; but this is still in the field of speculation and by no means proven. It may be said that we can resort to the *complement fixation*, *agglutination* or *precipitation* tests, but these are laboratory resorts and quite beyond the average practitioner in the field. Moreover we are here in the presence of an *ultra-visible germ* likely therefore to defy the manipulations of even the laboratory. With the *visible* or *microscopic germs* the case is different. The old resort of inoculation of a susceptible ani-

mal remains the most available field resort for the practitioner. But even this is often too expensive or too difficult. It may be impossible in an infected district to find susceptible animals remaining. If they are to be found, more likely than not, they belong to a breed so carefully guarded and of so high a value that it is impossible to secure them.

The *diagnosis* is usually based on a sudden and rapidly increasing mortality in sucking or weaned pigs, in a herd that has just received an addition from without, or that has wandered out of its usual boundary, that has had a sow recently sent to be bred, that has had a new attendant with unwashed clothes, or that has been fed kitchen refuse with uncooked fragments from bodies of pigs, that has been visited by butchers or drovers, by buzzards or other carnivorous birds, or that drink from a stream passing through pens higher up. If the first sufferers have been those that have temporarily left the herd; if they have hot snouts and ears, refuse food, seek seclusion, are costive or scouring, or in chronic cases if they become unthrifty and pine, and if, after death, they show inflamed bowels, with projecting, circular, necrotic ulcers in the ileum, cecum or colon the genuine hog cholera type may be accepted.

*Treatment is inadvisable.* Even apart from the high mortality, the continuous succession of cases, so long as susceptible animals remain in or come into the herd, or are born into it, makes the preservation of the infected a losing resort. In Great Britain the whole herd is killed and the place disinfected and this radical resort is as fully justified as in the case of *rinderpest* or *lung plague*. In America on the other hand we have fallen back on *immunization* by *inoculation*. When the question is on preserving a herd that has passed through the disease and has thus become immune, or even that has been immunized by artificial means it is always needful to take into account all the possibilities named under *foot and mouth disease* in which the survivor may still carry the germ for a greater or less length of time and communicate it to the susceptible animals which may come into too close proximity with it. All such infection-bearing cases should be removed from the herd that is to be kept.

*Prophylaxis.* The old and entirely unobjectionable method of keeping a herd pure, is as feasible today as it ever was. Have pigpens constructed of salt glazed brick, walls and floor, with non-ab-

sorbing mortar, and proper drainage into cesspools kept disinfected. Have the brick partitions high enough so that inmates of adjacent pens cannot come in contact. It is well to have not more than 3 pigs in each pen so that infection accidentally entering one, can be promptly *stamped out* without endangering the whole herd. Start with a sound herd, from a sound herd, guarded against any chance of exposure in coming to their new home. See that the water supply comes from a pure and unquestionable source. Breed from your own sound herd only. Let no sow leave your herd for service, and no boar be hired, exchanged nor borrowed for service in your herd. If fresh or superior animals are wanted, for improving the home herd, see that they come from a herd that has long been absolutely sound, uninoculated and unexposed in any way, and to avoid contamination in transit keep the new arrivals in quarantine for at least a month under a separate attendant, at a safe distance and under the closest supervision. See that all their food and litter is raised on your place apart from all swine, or that it comes from a place similarly protected. Send no animals off the premises to market or fair to be again received back into the herd. If your herd is superior to all others, be satisfied with that, and with the extra returns that they bring, on account of such higher quality, and reputation for unquestionable soundness. Butchers, pig-buyers and others must not be allowed in the pens, nor to handle their occupants. Kitchen slops and scraps are sources of the greatest danger, if pork or lard from outside the farms has been used for cooking. The same remark applied to tankage and other products of packing houses. These may have been subjected to a sterilizing heat, but the killing house is liable to frequent infections and the accidental conveyance of virus into a sterilized product after heating, not at all impossible. The common use of swine for consuming left overs, scraps, carrion, and all that would otherwise go to waste is virtually an invitation to develop any disease within reach and to which the genus is susceptible. The rational way to meet this is to abandon this kind of diet. Apart from organic and inorganic poisons, such food may usually be utilized if sterilized by heat under such rigid precautions as will exclude any possibility of contamination.

Immunization. In approaching the subject the most important thing is a protest against all thinking which is obscure or indefinite and all words or names that are equivocal or susceptible of

two meanings. In our best writings, veterinary and medical alike, we confront the words *vaccine, vaccination, vaccinated,* which according to *philology* mean, if they mean anything *pertaining to the cow, inoculating from the cow,* and *immunized by inoculation from the cow.* The root word is *vacca* a cow, and a whole family of words are lawfully begotten from this—*vaccinia* or *variola vaccinae,* cowpox; *vaccinate* to transfer cowpox by inoculating with the exudate of cowpox vesicle; *vacinifer* the animal (child or heifer) on which cowpox is cultivated; *vaccine* farm, the premises on which vaccine virus is raised on heifers or calves; *vaccin-style* or *lancet,* the instrument on which the cowpox virus has been dried up, to be used for scarifying or abrading the skin in *vaccination.*

All such words have so far followed the laws of language and retained their own proper, and original meaning. Each retains its original, definite, unequivocal meaning and it cannot be safely used with any other significance. Each is well born, legitimate, and true to its birth; it cannot be used to convey a different meaning. But how vilely has the pure name been befouled? *Vaccin* is now used to mean an agent that is supposed to protect a subject against any communicable disease and in doing this has parted company with its legitimate organ *in the cow,* and may have been drawn from any living creature having no relationship whatever to the cow, and from any disease of cow or other animal, however widely removed from the bovine family. It is even applied to the products of microorganisms of any given disease and occurring in any animal whatever, having not the remotest relationship to the cow. The term *vaccination* has been made to do duty for *immunizations,* no matter by what this supposed *immunization* has been brought about. In short our word *root* and *branch* has been set apart from all that was clear and definite in its meaning, and now bids fair to become a *waif* among words with no definite meaning, but with unlimited power to puzzle the reader and to befog the mind. We have all heard the response to the question "*Why does the priest pray in Latin?*"—"*because it is the only language the devil does not understand.*" May we not well suspect that the enemy understood only too well this little group of Latin words begotten and born in one of the greatest boons that medicine has given to humanity, *Jenner's inoculation for small pox,* and that, none too well pleased with Jenner's gracious benefaction, he is now doing his worst to becloud its radiance and load the idea with uncertainty and infamy.

The terms *bacterins* and *serums*, are open to the same objections of *indefiniteness* and *ambiguity*. The best *bacterins* are the solutions, or extracts from the *killed bacteria* and can hardly amount to more than the *toxins* which are the immediate factors in producing the pathogenic symptoms and lesions, together with some *antitoxins* and other *antibodies*. The real protective action consists in the fact that they stimulate the polynuclear and other leucocytes and phagocytes to develop the *defensive materials*, but for the production of these time is required. They are therefore of small avail as curative agents: the potency of their action is prophylactic. Moreover if used on an already infected animal the addition they bring to the toxic element, will, in a severe attack, tend to sway the balance against, rather than in favor of recovery. The benefit received therefore can be mainly in very mild cases in which there was good prospect of recovery without their aid. *Serums* are a good deal characterized by the conceded indefiniteness of the word. It is naturally associated in the mind with the serum of blood but to be of any material value in this disease it must have been drawn from an animal that has recovered from this particular disease, and, better still, one that has been repeatedly *injected with small non-lethal doses, until it has become immune* and will no longer react to another dose. This serum contains, in large amount, the *defensive materials* of this disease and will therefore tend to a promptly *therapeutic action* on the system. It will act in this way in ratio with the amount of the *defensive materials* which it contains. In moderate cases of the malady it will usually assist greatly in recovery. In the more severe it will too often prove unequal to the task and the animal perishes in spite of it. But we cannot be sure that this serum will not retain a small amount of the *toxins* and even of the *microbes* from which the malady sprung into being. If therefore the inoculated animal survives, there has occurred a limited production of *defensive materials* and the leucocytes once started on this good work will continue to carry it on more or less. The result has been called *passive immunization*, and the period of its sway will vary from the time necessary to bring about recovery in the inoculated animal, to the *immunization* for a number of months and upward.

The drawbacks to the practice are evident on the surface. In infected herds a variable number perish though *serum-inoculated*, the death dependent on the virulence and potency of the germ then

operating in that locality, on the difference between this germ, or the germs, and those employed on the animals used to make the serum; and on the conditions in which the inoculated animals live. We cannot shut our eyes to the fact that though the gravity of the malady may be usually due to the *ultra-visible, filterable germ*, yet the numerous other microbes that in different outbreaks modify the nature of the malady, giving a definite character to each outbreak cannot always be fully met by the defensive matters in this particular brand of serum, lacking it may be in the most essential element which dominates in a given outbreak, and thus failures are to some extent inevitable. We have long known that the fatal swine fevers are not all simple and exactly alike, and we cannot trust that the *immune-serum* made for the country at large, at a distance from a particular outbreak, will exactly meet the demands of that outbreak. Then again the use of an *immune serum*, however good, even for this outbreak before us, never quite arouses the defensive powers of the leucocytes, as does a genuine non-fatal attack of the same brand of the malady, as is now prevailing. It was such failures as these that drove Dorset, McBryde, and Niles to the adoption of the *simultaneous* method in which a large dose of the *immune serum* was injected on the one side and a minimum dose of the *unaltered* virus of the prevailing disease on the other. A reaction is caused, but the disease is mild and deaths rarely occur. It is a resort to nature's own method of immunizing, but is liable to the same objection, namely, that it is a multiplication and possibly a distribution of the germ and of the disease. We have long been aware that the best that *immunity* can do is to give a *strong resistance* to an invasion of the same germ again, and to the production of the disease anew in the same system. This we can be reasonably assured of, but we cannot be assured that the disease-germ will be definitely killed, nor prevented from survival in the *immune system*, nor that it will be placed beyond the power of leaving that system to invade other and more susceptibe animals. *Carriers* of this kind have been long known in *typhoid fever, tuberculosis* and other diseases in man and even in this *complex hog cholera*. The recovered subject itself becomes *strongly* insusceptible to another acute attack, but other more susceptible subjects, living with him can contract the disease from him in, it may be, a fatal form, but in any case in a form that will extend pestilentially among the non-resistant. The inoculated are saved, the unin-

oculated on every side fall the victims. Our *inoculated soldiers* are truly *immunized*, the *uninoculated* citizens where these military men carry on successful war fall the victims. Similarly in *tuberculosis* the selected mild and slow cases, sent to the preventorium, or asylum, and to an open air life, have the disease checked, it may be apparently cured, and are then sent back to their city homes to propagate the disease *now latent in them*, among their predisposed families and to prepare a new lot of candidates for open air treatment or for the grave as the case may be. Trudeau is a striking example of this survival; he improved in the Adirondacks air, and spent the remainder of his life there in helping others, but finally died of tuberculosis in the lauded Adirondack hills. Our open air sanitaria are good so far as they go, but they do not go deep enough, nor far enough, to completely circumscribe and exterminate the germ, and thus they all come short in their result. We can do better in the lower animals where we are not restrained by a sense of the sanctity of human life. We can *stamp out* rinderpest, lung plague, foot and mouth disease, rabies, glanders, sheep-pox, Texas fever, tuberculosis, Malta fever and a host of other pestilences, and the medical sanitariums, if fortified by a sense of their duty to humanity of the coming ages, could *stamp out* tuberculosis in man, not so rapidly it is true, but not less surely if they would rise to the occasion, devote themselves to prevent the diffusion of the germ as they now do to the check of the rapid progress of the affection.

In *hog cholera* the simultaneous injection of the *defensive matters* and the *virus* is in the main a bid for a wider diffusion of the *disease-germ* and no candid mind, after surveying the whole field, can fail to associate the unprecedentedly wide practice of this method and the altogether unexampled extension of hog cholera. I do not desire to detract one slight iota from the brilliant record of Dorset, McBryde and Niles, but in their failure to see the matter from all sides, they have made the Bureau of Animal Industry and a great body of the veterinary profession the main disseminators of the infection; they have seeded a field, wide as their United States, in which hog cholera in its varied forms may find a congenial home for all time to come. With a property of 68,000,000 hogs valued at $571,000,000 and a correspondingly large yearly increase in pigs, the field is almost beyond limit, and the value of the method, great as this concededly is, in saving the race

through the present generation, will not bear mention, in comparison with the enormous losses yearly entailed on the nation for all future time. It is useless to plead that, under professional direction, this fabulous loss can be prevented, the condemnatory evidence is before our eyes, distributed all over the land, wherever swine are raised, and while he may close his eyes who will, this evidence will continue so long as we persist in distributing the virus by law and *misnamed* sanitary methods. If our methods must be limited to *mere remedies for a disease universally prevalent*, if we cannot extend our mental horizon to behold the incomparably vaster field of the great future, with all its limitless possibilities for good and evil, the human race has already, and often, surmounted greater barriers and has outlived them, but has it reached the status which has been set for it? Let us compare the progress of the last fifty years of free thought, opening up scientific light, and earnest striving, with all the available and rapidly developing helps of this now breathlessly evolving world, and say whether we, with the greater future still before us, can afford to ignore our highest coming prospects and content ourselves with the scraps of an increasingly decadent past. If we persist in literally cultivating some of the greatest evils of the world and putting away from us the proffered good, shall we not come under the condemnation of the greatest, and noblest leader that humanity has ever had. "Therefore I say unto you, The Kingdom of God shall be taken away from you and shall be given to a nation bringing forth the fruits thereof." Our portion of God's universe given us for a lifetime on this earth, is ours if we bring forth the good fruit, not if we accept and favor the evil. This *simultaneous method* of holding in check, for the existing generation only, of a great evil, has concealed in it the seed of a far greater crop of evil for those that come after us and it is for us to secure for them this harvest of good, or, to sow for them a prospective crop of never ending harm.

This *simultaneous method* has already been commercialized, and its predecessor *cowpox-vaccine*, to use a tautology here necessary, has already produced its natural evil fruit in our outbreaks of foot and mouth disease in Massachusetts and Michigan, and it has itself, through its *serum and virus* scattered the same infection widely in the west in the past two years. Commercialism in this matter has already had its chance and has been found woefully wanting. The licensing of the commercial factories by the Fed-

eral Government has flaunted before the eyes of the world that even national authority is impotent to prevent this gross evil and wrong. Even our own profession has been drawn into a subserviency to and co-operation with the wrong, and its concurrence has been insidiously sought by the promise of larger practice and better income. Finally the stockowner has been drawn into a questionable copartnership. He has a large herd of swine, more or less ready for market, and the hog cholera infection has come into dangerous proximity. Delay threatens to bring a complete loss, so he has the herd subjected to the *simultaneous method* of protection and, in a few days, ships them to a large public market making use of cars, roads, pens and yards where other store hogs are to come immediately after them. Every hog of them has been charged with the virulent infection, but this herd is safe, let other stockmen, herds and states look to their own protection. The others can, it is true, subject their hogs to the same protective treatment. But every new herd, so treated, increases the number of *infection-carriers*, turned out at large and ready to spread the seeds of the disease wider and wider.

The testimony of serum-manufacturers, and even of veterinarians, is usually strong in denial of any infection from inoculated hogs, but close questioning will mostly bring out the admission that a certain number of the inoculated animals die and it is by no means a fact of yesterday only that hogs that have recovered from the disease, caught in the usual way, have become, for a time at least "carriers", and have transmitted the infection to susceptible subjects. These facts are beyond dispute, and putting the two together the conclusion is inevitable that the animal that bears the germ, however healthy such carrier may appear, can transmit it to the vulnerable. It is not requisite that we show that all recovered or inoculated animals can do so, nor the exact period for which the infection may be given; it is enough to show that some carry it and for a considerable period, to shut out the method from indiscriminate or general use. The single germ, started in one vulnerable subject, increases rapidly, by myriads, and there is no limit to the infection distributed. The limit becomes one of receptivity only, so that the *method* that will distribute a few germs only, is one that should be debarred from general adoption, or for use on animals that cannot be guaranteed complete seclusion from vulnerable stock, for a length of time. Filtered serum even is inadmissible. Large microorganisms can be passed through

even a fine filter if time enough or pressure enough is used; how much more then the ultramicroscopic, unstainable and undemonstrable.

*Dorset and Henley's Clear Sterilized Serum.* It is encouraging to see that Dorset recognizes the imperfections of the serums in use and, in collaboration with Henley, has produced a *"clear and sterilized hog cholera serum"* devoid of erythrocytes and contaminating ingredients but retaining all the antibodies of the blood. This is a recognition of the undesirability of the existing method and a step toward the ideal condition of getting *altogether rid* of every living germ of the disease, and trusting to the antitoxins, and other defensive bodies—alexins, agglutinins, phylaxins, bacteriolysins, cytolysins, opsonins, precipitins, etc. The ideal, I need not add, is to exclude from the immunizing agent every living germ that may by any possibility become the starting point of an outbreak. It is a sorry recommendation of a prophylactic to say that under unfavorable circumstances it may become the centre for a new dissemination of the disease. It is no fair argument to say that the prophylactic which endangers infection, gives a stronger immunity in case of recovery. The same is even more true of the disease itself contracted in the ordinary way, and for exactly the same reason—the animal prophylactically treated has in reality passed through the disease, and its protective machinery has been set in motion to build up an effective barrier against a second attack. The same protection can be had by passing the whole herd through the disease in a mild form. For the good of the state and nation this is forbidden in all advanced communities; how much more should the official distribution of live pathogenic germs be interdicted even when done under the mask of sanitation.

And yet I read in Hoare's *"Veterinary Medicine"* (1913) the following under *Swine Fever*, p. 549 *"The carcasses of mild chronic and recovered cases often present a normal appearance, and there is no reason why they should not be consumed. The disease is not communicable to human beings."* But what of swine, and of the uncooked kitchen scraps fed to them? If canned under heat—sterilization, the meat could be safely sold, but not otherwise.

When permissible and desirable to deal with *hog cholera* and its complex forms, by *immunization* (rather than by speedy de-

struction and thorough sterilization) *the living germ* should be completely discarded, and the agents that are completely sterile should alone be employed. Even *hyperimmunized serum* may be unsafe, since recovered hogs, or those that have been *strongly immunized* may be carriers of the germ though not themselves any longer susceptible to it. They may be *insusceptible to the disease,* and yet *carriers of the germ* which *can infect the susceptible. Hyperimmunized serum* in some cases may be entirely destitute of living germs, but it may in others retain some and prove thus unsafe and dangerous to use in premises into which susceptible animals can come. If it is *completely sterilized by heat* it can transmit no living germ nor disease any more than bacteria can when *really killed by heat.* If both these agents have been heated to sterilization they can be used together, the bacteria introducing the toxins, which *start the defensive cells into active production of defensive matters,* while the *serum of the hyperimmunized brings in the various defensive matters* ready made. The *killed bacteria* may be dangerous in *infected animals* or those *sick with the disease,* as, in large doses they may carry such a large amount of toxins as, along with the toxins produced by the germs already present and multiplying in the system, they may contribute to produce a dose that will be toxic and fatal. They kill, however, by increasing the amount of the *non-vital chemical toxins* and not by infection. If both are thoroughly sterilized they will carry no living organism and cannot add such living organism to the animal operated on, nor to another animal which is still *unimmunized.*

As early as 1880 I secured immunity by injections *subcutem of the heat-sterilized virus* and though the animals operated on did not always thrive well for some time thereafter, yet they resisted exposure to infections as do hogs that have passed through the disease and recovered. (Dept. of Agri. Report 1880, pp. 515-9. The same method I have often employed since in other diseases with good results. Reason suggests this treatment and experiment justifies the logical use.

When the *simultaneous method* is used it is prohibited in sucking pigs, cows approaching parturition, and any animal that is already infected or sick. I would add that so long as it can become a means of spreading the infections it ought not to be used at all.

*(To be continued)*

# MANURE DISPOSAL AS A FACTOR IN THE CONTROL OF PARASITIC DISEASES OF LIVE STOCK

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The results of the work on hookworm disease of man in the southern United States and elsewhere in the world has emphasized the major importance of sanitation and especially of a proper disposal of feces as a control measure for this disease. Not only hookworms, but the other worms parasitic in the digestive tract and its adnexa in man, depend on the feces first of all as a vehicle for their transmission. But this is equally true for the parasitic worms infesting our live stock and domesticated animals. The eggs or larvae of stomach worms, nodular worms, ascarids, *Strongyloides*, whipworms, tapeworms, flukes and even lungworms pass first to the outer world in the manure, and a proper disposal of the manure is the first line of prophylactic attack.

While the importance of a proper disposal of feces has been emphasized and is being emphasized as a control measure for such parasites of man as the hookworm, the proper disposal of manure as a control measure for a large number of important parasites of live stock has not been adequately emphasized. Yet the fact is that this point deserves special consideration. Our live stock is constantly exposed and re-exposed to parasitic infestation by virtue of the fact that these animals eat off the ground, so to speak, to a great extent. Our horses, cattle, sheep and goats graze on pastures, our hogs root up the ground in search of white grubs and hunt through swampy pig-pens for the corn which is dumped into the mud, our chickens pick most of their food off the ground or out of the soil, and even our dogs, as a rule, seem to think as much of food that has been tossed out in the back yard as of food presented in a clean utensil. This mode of feeding exposes the food of these animals to contamination, since the feces of the animals are deposited on the ground, and the area in which the animal habitually spends its time is the area in which it feeds and which it contaminates. The prevention of this condition is for the most part impossible. The prevention of parasitic infestation as a result of this condition is a matter that calls for repeated treatment with suitable and adequate anthelmintics, thereby cutting down the

supply of worms in the animals and so shutting down egg production at its source. Vigorous measures along this line may be expected to render the manure reasonably safe on the score of parasitic infestation, since parasite eggs must be produced in large numbers in order to permit of perpetuation of parasites under the operation of the laws of chance.

But while the manure deposited on the pasture is not a thing that can be readily controlled, the manure from the barns and other buildings where domesticated animals are housed is something that can be more or less controlled. Contrary to the general rule for human feces, barnyard manure must be utilized as fertilizer, which means that it must go back to the fields somewhere. Now if the animals furnishing this manure were never on pasture and were always fed from clean troughs and racks, they would tend to lose any parasitic infestation they might have, the manure simultaneously tending to become free from parasite eggs and larvae and safe for use on the fields anywhere so far as parasites were concerned. I have seen old horses which had been used in a large city and kept off pasture which had almost none of the strongyles of the large intestine which are so common in horses as a rule, and sheep raised under experiment conditions which were almost free or completely free from stomach worms. But the farm animal from which barnyard manure or stable manure is obtained is usually only a transient in the barn or barnyard or stable. These animals are in the pasture every day or a part of the year, and the barnyard or stable manure is usually as infective to begin with as is that on the pasture.

There are two obvious lines of attack in disposing of the infective features of this manure. One would consist in treating the manure in such a way as to kill the parasite eggs and larvae, and the other would consist in disregarding this feature and placing the manure where it would have little or no capacity for infecting stock.

The first method offers a field for a large amount of investigation, but this investigating has not been done. Broadly speaking, one would have to determine how long the eggs and larvae of the various species of worms involved lived in manure piles, in spread manure, in closely packed manure; the effect of sunlight; the effect of moisture; the effect of various chemicals, the chemicals in turn being of a nature not to injure the fertilizer value of the manure. There are practically no data on this and little could be surmised without such data.

The second method is one concerning which we have adequate data. It merely involves the application of facts which are fairly well known, but which have received little emphasis in this connection. We have emphasized to a certain extent the value of stock rotation on pasture as a control measure for parasites. We know that if a pasture has one kind of stock on it year after year it becomes highly infested with the eggs and larvae of the parasites which infest that kind of stock. We might state this briefly and alliteratively as follows: *Permanent pastures perpetuate parasites.* Such pastures are dangerous—for that kind of stock. They may be quite harmless for other kinds of stock. Thus horses may safely follow swine or follow ruminants (cattle, sheep and goats); swine may follow horses or ruminants; ruminants may follow horses or swine. These groups have worm parasites which in general are not transmissible to each other, so that the manure from one group is not infective for the other groups. The fact that all the ruminants are infested with the deadly stomach worm makes it undesirable to attempt to rotate cattle, sheep and goats with one another.

But the extension of this idea of stock rotation to the disposal of barnyard manure and other manure has not been emphasized. I do not remember ever seeing the idea stated, yet it is probably in print. At any rate it deserves to be emphasized. Manure which is to be taken to the fields should be disposed of, wherever possible, with a view to its possibilities as a carrier of parasitic infestation. It will not always be possible to make the application. There are dairy farms where only cattle are kept, and the manure from these cattle must go back to the pastures and fields where the cattle will graze, unless exchange is made with neighboring farms running different kinds of stock. There are horse farms, hog farms, and sheep farms in a somewhat similar situation. In such cases one might bear in mind that well rotted manure would be safer than manure which had not been held long or rotted. The time element involved here permits of the death of eggs and larvae as a result of various unfavorable conditions, and the rotting process may well prove lethal, since in nature the worm eggs are washed onto the pasture and the larvae are capable of travelling, in some instances, yards away from the manure deposits. It is also likely that lime would kill larvae when added to manure.

However, there are farms where there is an option as to the

disposal of the manure of two or more kinds of stock. Horse manure may be put where horses are to run or where cattle are to run; where such alternative offers, it is advisable to put it where cattle are to run. The same principle applies to manure of ruminants, swine and horses. Where there is a considerable amount of poultry droppings, as there sometimes is, it may be regarded as safe for anything other than birds, and manure from other animals, generally speaking, will convey no parasites to birds. On the other hand, the feces of man and the dog are always to be regarded as dangerous. While it is true that there is little necessity for considering the disposal of quantities of dog feces, it is also true that the casual straying over our farms by dogs maintains a persistent supply of gid in sheep, hydatids in swine, other bladderworms in sheep and cattle, and other parasitic pests. While it is true that we do not make a practice of fertilizing our soil with human feces in this country as they do in China, it is nevertheless true that the informal practice exists in this country even if there is no statement of it as a formal agricultural measure. It is well known that in the southern states there has been, and still is over a large territory, an almost total neglect of sanitary provision for disposal of feces in the rural districts, and something of this neglect is true for some parts of the Northern rural districts. In human feces we not only have the source of numerous parasites of man, but the source of such parasites of our stock as "measles" (cysticercosis) in cattle and swine.

It may be urged that much of this barnyard manure is plowed under and the fields so treated sowed to crops which will be gathered and not fed back to stock. Quite true; and that it is a safe method of avoiding infestation. On the other hand, the plowing under of manure for forage crops cannot be regarded as assuring safety. There are possibilities for the survival of eggs and larvae and the likelihood that larvae would escape from the manure and soil under certain conditions.

What we are urging is no panacea, and it is not of universal applicability. We only urge that manure be regarded as the most important means of conveying parasitic infestation; that it be regarded as potentially dangerous; that in situations where there is an option in disposing of manure, it be placed where animals of the sort furnishing the manure will not be exposed to parasitic infestation from it. This same measure will also serve as an aid in the control of some bacterial diseases.

# HORSE FLESH AS HUMAN FOOD*

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*Historical Outline.* The use of horseflesh as a human food is as early a custom as that of using the flesh of the other food producing animals. Archeologists have unearthed proof of its use by the caveman in northern Europe. That this custom was in progress long before the time of Moses, is evident by the prohibitive clause in the Mosaic Law against the consumption of horsemeat. Hippocrates refers to its use and Herodotus describes it as an early custom that prevailed from the extreme East to the Ural Mountains. Later, Xenophon, Pliny and Galen gave records of its use among the early Persians, Greeks and Romans. The Saxon tribes that occupied northern Europe sacrificed the horse as the most noble animal to their gods Odin and Freya, and accompanied the ceremonies of the sacrifices with great feasts in which the eating of horseflesh was customary. It was in their zeal to spread Christianity and to remove all signs of pagan worship and sacrifice, that Pope Gregory III. and his successor Zacharais I. sent to St. Boniface, the christian apostle in the Germanic countries, edicts prohibiting the use of horseflesh. These decrees were also issued to the people of Iceland, among whom hippophagy was so popular, that it was only in the year 1000, three centuries later, that the people openly discontinued this custom.

The nomadic tribes of Tartars, Kirghis and Kalmucks wandering about southeastern Russia and its Asiatic possessions have used horsemeat for a long time and were extremely fond of it. In Persia, asses were considered a delicacy, and throughout Asia the eating of horseflesh was customary. The Chinese had used horseflesh for ages and according to Ostertag had even developed a special breed of "fat" horse, that was characterized by its delicate bone structure, fattening powers and savory meat.

A few centuries ago during the period of exploration and discovery, the following information appears in regard to the use of horseflesh.

Phillips writes of the use of the flesh of horses, asses and mules by the Moors in Tunis, Algiers, and also of the presence of

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a species of a small horse that was raised solely for food purposes by negroes in Juida, Africa. In Marmol, Africa, wild horses were used for food by the natives. In South America, French and English explorers repeatedly mention the use of the flesh of wild and domestic horses for food purposes, as a custom in the various countries. Sir Francis B. Head stated that the Pampas ate the flesh of mares, which they never rode. Delvaille refers to the natives of Bolivia as preferring horsemeat, and others state that hippophagy was in vogue in Chili and among the Patagonians.

During the French Revolution the Parisians used horseflesh constantly for six months without bad results. To what extent and whether the custom of eating horsemeat was popular or prevalent among the people of the European countries prior to the beginning of the nineteenth century cannot be determined but it appears that later its sale and use was gradually permitted by the various governments as a necessary or progressive measure. Thus in 1807, in Denmark when the Danes were under siege, this measure was officially adopted. Larrey, the famous surgeon to the armies of Napoleon, used horsemeat to feed the sick and convalescent soldiers in the various campaigns and mentions its use in combating a scurvy epidemic. In 1840, Munich and in 1855, Germany permitted the sale and use of horseflesh. Vienna sanctioned its public sale in 1854. In France, Decroix, St. Hilaire and others had publicly agitated the use of horsemeat for many years and finally succeeded in influencing the government to authorize its sale and use on July 9, 1866. Horsemeat is now publicly sold in the other European countries with various degrees of popularity.

*Use in Europe and United States.* In 1889, a regulation was passed in Great Britain permitting the sale of horsemeat. No statistics of the extent of the use of horsemeat in Great Britain were available. There lately appeared the following in the London Meat Trade Journal: "Shops for the sale of horseflesh are being introduced into every large town. The high price of beef, mutton and pork is giving horseflesh an opportunity to acquire favor, and if the present cost of living continues after the war, horseflesh may become a permanent article of food." (Quoted from the Butcher's Advocate.)

In France, the use of horsemeat has been marked by an increasing public demand, as may be seen from the following statis-

tical data. These are incomplete and probably underestimated. Ostertag states that two-thirds of the horsemeat is manufactured into sausages and also that more than 100,000 of the 600,000 families in Paris use horsemeat. In 1910, twenty-nine million pounds of horsemeat was produced for consumption in Paris and its environs.

*Number of Horses, Asses and Mules Slaughtered in Paris—1866-1910*
(Gathered from various sources)

| | Total | Horses | Asses | Mules |
|---|---|---|---|---|
| 1866 (from July 9) | 902 | | | |
| 1867 | 2125 | 2069 | 59 | 24 |
| 1868 | 2405 | 2297 | 97 | 11 |
| 1870–71 | 65000 | 64362 | 635 | 3 |
| 1872 | 5732 | 5034 | 675 | 23 |
| 1875 | 6865 | 6448 | 394 | 23 |
| 1878 | 11319 | 10800 | 438 | 31 |
| 1888 | 13475 | | | |
| 1898 | 21476 | | | |
| 1900 | 25059 | | | |
| 1902 | 31342 | | | |
| 1904 | 44279 | | | |
| 1906 | 58856 | | | |
| 1910 | 60338 | 57734 | 822 | 223 |

There are two horse abattoirs under municipal control which supply Paris. The retail establishments handling horsemeat rapidly increased in number from the date of authorization of its sale. In 1874, there were 48;in 1889, 132; in 1894, 212; and in 1906, 299. (Moreau$_9$.)

*Number of horses slaughtered in Germany*—(Ostertag) 10

| | | |
|---|---|---|
| In Prussia | 1890–91 | 53,281 horses |
| | 1893–94 | 58,306 horses |
| | 1899 | 63,801 horses |

According to 28th annual report of Bureau of Animal Industry*, Germany in 1909, slaughtered 152,214 horses which provided 79 million pounds of meat; approximately 1½ pounds per capita. (There were also 6990 dogs slaughtered for food purposes.)

*Number of horses slaughtered in Municipal Abattoirs in certain cities* (15)

12890 Horses slaughtered at Municipal Abattoir in Berlin
18290 Horses slaughtered at Municipal Abattoir in Vienna 1892
7132 Horses slaughtered at Municipal Abattoir in Milan, Italy 1907
1375 Horses slaughtered at Municipal Abattoir in Liege, Belgium 1906

*Comparison of number of animals slaughtered and average per capita consumption of meat in Belgium 1905-1909* (2)

| | | | |
|---|---|---|---|
| Horses slaughtered | 38200 | Horsemeat consumed per capita | 1.51 kgm. |
| Cattle slaughtered | 438900 | Beef consumed per capita | 17.54 kgm. |
| Calves slaughtered | 350500 | Veal consumed per capita | 3.03 kgm. |
| Lambs and Sheep slaughtered | 352400 | Lamb & Mutton consumed per capita | 0.74 kgm. |

*(Statistique Agricole Annuelle—Dept. of Seine 28, B.A.I Annual Report).

At the Municipal Abattoir in Odessa, Russia, out of a yearly slaughter of 150,000 food animals, about 300 horses are slaughtered during the winter months for use by the Tartars. (15)

Probably the first mention of the use of horseflesh in the United States was made in 1898, when in the appropriation of that year for the Bureau of Animal Industry, provision was made: "That live horses and the carcasses and the products thereof be entitled to the same inspection as other animals, carcasses and products thereof."

Most of the horsemeat produced was prepared for export trade, as may be seen from figures below, though probably some of it was also for domestic consumption. In fact it seems that this regulation was enacted solely for the purpose of encouraging exportation, as the following letter appears by Vice Consul Blom, in the Consular Report of April, 1900: "Several years ago I called the attention of Danish dealers in horsemeat to the American supply. I have now to report that the business is increasing rapidly and the meat from the United States gives satisfaction. The consumption of horsemeat in Denmark is comparatively large and Copenhagen is a distributing port for Sweden, Norway, Finland, Russia and the German Baltic."

*Horses exported from United States, 1900–1903* (1)

| Year | No. Packages inspected horsemeat | No. certificates issued | Packages Exported | Weight |
|---|---|---|---|---|
| 1900 | 602 | 8 | 472 | 188,800 lbs. |
| 1901 | 821 | 9 | 880 | 249,900 lbs. |
| 1902 | 638 | 11 | 638 | 170,986 lbs. |
| 1903 | 70 | 1 shipment | 70 | 28,000 lbs. |

*Description.* The dressed carcass of the horse is characterized by its dark color, the absence of any extensive fat deposits, and the peculiar yellow coloring of the fat. It may be readily recognized by the length of the neck, number of ribs, the non-lobulated kidney and the many distinguishing bony structures, etc., though there may be considerable variations in the different breeds and types. There is lack of subcutaneous fat that makes the removal of the hide extremely difficult, and the fat deposits in the region of the kidney and the flank are relatively meagre, even in well nourished animals. In such animals the tendency is for the fat to be of a lighter shade and there usually is a rather thick layer on the median line and lower abdominal wall; there is also a peculiar fat deposit of firm consistency on the neck

(sometimes called "comb-fat") which differs from the usual yellow soft horse fat. The mesenteric fat has a darker yellow color and is scantily deposited.

Horsemeat has a deep dark red color, bordering almost to a brown or black and a bluish sheen appears on exposure to air. On section, the fascia is very prominent, and the absence of intermuscular fat and the lack of the marbling quality is very noticeable. Leach describes horseflesh as having a coarser texture, and short muscle fibres as a rule; Edelman describes the fibres as very fine; Huidekoper refers to the flesh of asses and mules as having a finer grain than that of the horse.

The bone-marrow is soft, greasy and waxlike, of a yellow color and stiffens when exposed to air. The offal of the horse, ass or mule, like the offal from the other food producing animals, may be grouped into edible, inedible and therapeutic by-products.

*Composition of Horsemeat* (Wiley) (13)

| | |
|---|---|
| Water | 69.81 |
| Water in fat-free substance | 76.91 |
| Fat | 9.61 |
| Protein | 19.47 |
| Protein insoluble in water | 14.83 |
| Gelatinous protein | 1.23 |
| Meat bases | 1.70 |
| Glycogen | 1.82 |
| Ash | 1.01 |

*Water Protein and Fats in Common Meats*—(Rubner) 12*

| | Water | Protein | Fat | | Water | Protein | Fat |
|---|---|---|---|---|---|---|---|
| Lean Beef | 76.3 | 20.5 | 1.8 | Fat Beef | 71.0 | 19.9 | 7.7 |
| Lean Veal | 78.8 | 19.8 | 0.8 | Fat Veal | 72.3 | 18.9 | 7.4 |
| Lean Pork | 72.6 | 19.9 | 6.8 | Fat Pork | 47.4 | 14.5 | 37.3 |
| Lean Poultry | 76.2 | 19.7 | 1.4 | Fat Poultry | 70.0 | 8.5 | 9.3 |
| Very Lean Mutton | 76.0 | 18.1 | 5.8 | Very Fat Mutton | 47.9 | 19.8 | 36.3 |
| Horsemeat | 72.3 | 21.7 | 2.5 | Horsemeat | 72.3 | 21.7 | 2.5 |

In 100 parts of meat free from fat the following amount of dry substance was found: ($Rubner_{12}$)

| | |
|---|---|
| Beef | 21–22 |
| Veal | 20–21 |
| Pork | 21–23 |
| Mutton | 21 |
| Horse | 23–25 |

In the chemical analysis of the muscles of the various animals there are minor differences that bring out the distinguishing

*NOTE.—In the edition of Rubner (Lehrbuch der Hygiene) consulted, evidently composition for fat beef was given for lean beef as numbers given above were in transposed order.

properties of the various meats. While horseflesh does not materially differ to any great extent from the flesh of other animals, some of its individual characteristics are: the relatively large proportion of glycogen; the presence of certain extractives, and the peculiar qualities of horsefat.

Glycogen, or animal starch, is normally found in the muscles and in the liver, where it is stored up for future distribution in the body. Its physiological function is to aid in the metabolic production of muscular energy and animal fat, and its presence is not marked by a constant quantity in all the muscles of the body. An herbivorous diet that is rich in carbohydrates may be a probable factor in an increased glycogen content in the muscles of horses. Glycogen is present in greater quantities in well nourished horses, while it may be slight or totally lacking in overworked and underfed animals. Lobster and liver are other foods containing a relatively high percentage of glycogen, and are high in public favor.

Leach states that taurin is present in the flesh of the horse. Taurin is an organic compound that originates from proteids and belongs to that class of nitrogenous waste products or extractives in which, creatine, creatinine, xanthine, hypo-xanthine, etc., belong. These latter named compounds are commonly found in variable proportions in the muscles of all animals.

A special characteristic of horsefat is its high content of olein. Horsefat has also a very low melting point, a characteristic crystallization form, a higher heat value and a greater iodine number, etc.

*Meat Inspection.* Horses are usually slaughtered in abattoirs operated exclusively for this purpose. To conduct a careful and thorough ante-mortem examination, a well constructed stable, with sufficient space and stableroom is necessary. The importance of the ante-mortem examination may be emphasized for the following reasons: the majority of the horses that would be presented at the abattoir would naturally not be in a perfectly sound condition, and it is of great importance to recognize the condition that sends each animal to the slaughter house, and to ascertain if this condition affects its acceptability. The ante-mortem examination would also eliminate certain conditions of diseases that may not be marked by visible pathological lesions and yet render the flesh dangerous or unwholesome. Finally it would serve as an effective control of glanders, the early discovery of which

is so important that every possible precaution to eliminate its presence in a food product, is justified. A diagnostic mallein inoculation test supplemented by a suitable laboratory serological test should be the routine procedure.

The necessity for a suitable stable under the complete control of the public health authorities is further emphasized in order to insure a proper and effective quarantine and prevent any temptation on the part of those interested to foil, or interfere with, the natural course and outcome of the test.

*Results of Ante Mortem Inspection on Horses (B.A.I. 1899-1903)* (1)

| Year | Horses Inspected | Rejected—subjected to post mortem exam. at abattoir | Post mortem inspection | Carcasses condemned at abattoir | Died at abattoir |
|---|---|---|---|---|---|
| 1899 | 3,232 | 27 | 3,232 | 181 | 43 |
| 1900 | 5,560 | 66 | 5,559 | 112 | 29 |
| 1901 | 1,991 | 3 | 1,992 | 103 | 27 |
| 1902 | 1,649 | 0 | 1,649 | 25 | 48 |
| 1903 | 3,344 | 0 | 344 | 11 | 0 |

The post mortem examination of the horse should be carried out in a similar manner to that practiced in the examination of cattle. A more detailed and careful inspection is carried on in examination of the head which is split open so as to expose the mucous membranes of the nasal cavity, the turbinated bones and the sinuses. A careful inspection is made of the mucous membranes of the larynx, pharynx and trachea. Examination should also be made of the kidney, serous membranes lining the body cavities, the articulations, withers, skin, etc.

The pathological conditions met with in the slaughtering of horses may be conveniently grouped as follows:

1. Conditions that are not likely to be dangerous to man, and not affecting the wholesomeness of the food; this group would include those which were rendered useless for domestic service as a result of an acute or chronic injury acquired through accident, overwork or misuse; also certain conditions, affecting sight, hearing, or ability to partake of food, thus handicapping or limiting the usefulness of the animal. Also conditions about the limbs, involving the bony structure, tendons and articulations. Perhaps, also certain vices lowering the working capacity of the horse. Parasites of the horse may also be included in this group. According to Ostertag parasites found in the body of food animals may be grouped as follows: "Parasites, which are not transmis-

sible to man; parasites, which may be transmitted to man by eating meat; parasites which are not immediately harmful, but which may become so after a preliminary change of host.'' Under the last mentioned group, *Echinococcus polymorphus* may be considered, and as ''they are more frequent in cattle than horses, they require no special reference''. The parasites that may be transmissible to man by eating meat, are not commonly known to occur in the flesh of the horse. Parasites found in the body of the horse under ordinary circumstances are not of special importance in considering meat inspection.

2. Conditions and diseases of horses which may affect the wholesomeness of the flesh or prove dangerous to man. These embrace extreme age, emaciation, suppurative conditions, diseases of unknown etiology, toxemias, etc.

3. This group includes dangerous infectious diseases of the Equidae that may prove dangerous to man. For example such as glanders, tetanus, less frequently rabies, tuberculosis, etc.

*Conditions causing Condemnation of Horses on Post Mortem Examination (B. A. I. 1900–1903)* (1)

| | 1900 | 1901 | 1902 | 1903 |
|---|---|---|---|---|
| Tuberculosis | 1 | — | — | — |
| Abscesses | 1 | 6 | 1 | — |
| Pneumonia | 6 | 3 | — | 1 |
| Pleurisy | 1 | 1 | — | 4 |
| Carditis | 1 | — | — | — |
| Enteritis | 1 | 3 | 1 | — |
| Peritonitis | 3 | 1 | 1 | — |
| Metritis | 1 | 3 | — | 1 |
| Septicemia | 12 | 17 | 12 | 2 |
| Pyemia | 5 | 4 | 1 | 1 |
| Anemia–Emaciation or Marasmus | 37 | 11 | 3 | — |
| High Temperature | 2 | — | 1 | — |
| Recent Parturition | 2 | — | — | — |
| Downers | 29 | 4 | — | — |
| Dead | 29 | 27 | 48 | — |
| Melanosis | 1 | 2 | 4 | — |
| Paraphymosis | 1 | 0 | — | — |
| Fistula | 6 | 1 | — | — |
| Open Joint | 2 | — | — | — |
| Gangrene | — | 1 | — | — |
| Pregnancy | — | 40 | — | — |
| Lymphangitis | — | 2 | — | — |
| Pharyngitis | — | 1 | — | — |
| Nasal discharge | — | 2 | — | — |
| Distemper | — | 2 | — | — |
| Jaundice | — | — | 1 | — |

*Opposition to horseflesh as a food.* The earliest and most effective opposition to the use of horseflesh is that in the Mosaic

Law. The papal decrees of the seventh and eighth centuries stopping the custom of sacrificing horses and horseflesh that existed among the Germanic tribes and the people of Iceland have already been referred to. Probably to these religious restrictions is due the prejudice that grew against horseflesh, and exists even to the present day.

Considerable opposition is also due to the sentimental feeling for an animal as domesticated as the horse. Any such sentimental feeling must be regarded as inconsistent in view of the fact that other completely domesticated animals are slaughtered for food purposes. Indeed it would be an act of mercy well earned by many a faithful horse, that has lost his early vigor to be sent to the abattoir, rather than to allow him to fall into the hands of some huckster or cruel driver to be underfed and overworked to a gradual death.

Horsemeat is conceded to be a wholesome and nutritious food by eminent authorities in this country and abroad.

The use of horseflesh for human food should also be considered from the standpoint of public welfare, and as an improving economic measure. It offers an economical acceptable flesh food especially for the workers who are unable to afford the luxury of the present high priced meats, and still find it desirable or necessary to have meat a part of their daily diet.

It seems indeed unreasonable that so much valuable food should be wasted, in the face of the privations that exist among the poorer population in the larger cities. Here the foreign element have in the majority of cases been initiated to the eating of horseflesh in their native land, and would gladly accept this product in view of its proportionately lower price.

The opposition to horsemeat on the grounds of its physical characteristic is unjustified. The taste of manufactured products or culinary preparations may be so disguised as to make recognition difficult or impossible. Certain preparations of horsemeat are relished and preferred by those who have not allowed prejudice to get the better of personal taste. A slight sweetness of taste is considered one of the qualities of horsemeat, while toughness is not necessarily characteristic of horsemeat any more than it is of any other meat, but depends rather upon the age, sex and condition of the particular animal which it has been derived from.

Ostertag refers to Pflüger as mentioning that when horsemeat

is used exclusively it is apt to cause diarrhea, which is directly due to a substance present in horseflesh that is soluble in alcohol and passes over into the meat broth when horsemeat is cooked. This material consists of 75% lecithin and 25% of neutral fat and cholesterin. This injurious effect is in some manner avoided when the meat broth is poured off or when horsemeat is prepared together with beef or mutton tallow. Huidekoper states that horsemeat should always be broiled or roasted.

The following are the conclusions that were reached by the Italian Army Veterinarians Costa and Mori in regard to the use of refrigerated horsemeat: "Flesh of horses in normal physiological condition slaughtered under suitable rest, whether skinned, or quartered and left in the skin, will keep perfectly well for two months, if subjected to a temperature between 1 and 4 degrees Centigrade and an air moisture of 60 to 70 degrees." Meat cut in small pieces will not keep more than 25 to 30 days. Flesh from animals in normal but tired condition will not keep longer than 20 to 30 days, showing signs of decomposition in 15 days. The flesh in the skin, if withdrawn from the refrigerator every five days and left for 24 hours in ordinary temperature, keeps in good condition for 20 to 30 days, if carcasses were skinned and quartered, preservation would be but 15 to 20 days. The liver does not keep more than 8 to 10 days when it turns pitch black, becomes unsightly and a few hours after removal from the cold cells decays, showing that this organ is the least resistant to chemical or bacterial change. The kidney keeps 20 days. Brain if not removed from the skull keeps two months, if removed but one week at the longest. Loss in weight was from 8% to 10% in 30 days.

Refrigerated horseflesh after 15 days turns dark to black. The consistency remains normal for a long time. Chilled horseflesh becomes tender in 10 to 45 days, the outer surface appears brighter than fresh horsemeat. After ten days storage in the cold room the meat cooks more rapidly than fresh meat and required the same time as is necessary to cook unchilled beef of a 2 to 5 year old animal. The meat of tired animals was found not to cause any bad effects but gave evidence of lack of taste."

Opposition to the use of the horse for food purposes as an individual cannot be upheld with any degree of consistency. Its particular habits of cleanliness together with the careful domestic

attention that it receives, places the horse in this respect on a higher plane than the other domestic animals. In the selection of food, the fastidiousness of the horse has often been exaggerated, nevertheless, it is conceded that the horse is more discriminating in the selection of food than the other domesticated animals. In comparison with poultry or swine, discussion is unnecessary.

The method of procedure of the ante-mortem examination described previously should allay the fears of the public in regard to the possibility of unfit, worn out, or emaciated animals being slaughtered. This careful examination followed by a careful post mortem examintion should give further assurance that every possible measure is taken to produce a wholesome product. Indeed comparison with the method of procedure and the findings in slaughtering aged, worn out and emaciated dairy cattle, would perhaps place horseflesh in a better light.

Tuberculosis exists in dairy cows in very great proportions and a considerable number are passed for food purposes in spite of having some tubercular lesions. After slaughter the poor condition of many dairy cows does not allow them to be presented to the public by way of the butcher shop in the usual cuts. Nevertheless, the consumer approves this product in the form of bolognas, canned meats, sausages, etc., with an ever increasing demand, after the original meat has been made acceptable by the addition of condiments and flavorings of various kinds. Tuberculosis among horses in this country may be considered a negative factor in comparison to its frequent occurrence in cattle and swine.

While there are no parasites present in horseflesh that are known to be transmissible to the human species, man may become affected with tapeworm by eating beef or pork containing the larval forms of the parasite; and trichinosis may be produced by the eating of pork.

*Restrictions and control.* Because horsemeat and its products will be placed upon the market as an inferior product and cheaper in price, adulterations and substitutions in various manners may be attempted by the unscrupulous. The public would be entitled to protection for such reasons as well as in consideration for those who have a natural antipathy for horsemeat. Such protection may be promoted by regulations governing the slaughter and sale of horsemeat, rigid routine inspection and laboratory tests of material suspicious of adulterations or substitutions.

Regulations governing the slaughter of horses usually restrict the process to abattoirs specially designated for this purpose. The carcasses are stamped conspicuously or marked in some way in order to identify the nature of the meat. Selling horsemeat and its products are also limited to establishments that handle this product only, known signs, and the wrapping paper may also bear the information as to the nature of the article. Similar methods are used to control restaurants and factories handling horsemeat.

Rigid inspection should be exercised to detect unauthorized sale as well as any suspicion of adulteration or substitution, and legal prosecution should follow in all such cases.

*Tests.* There are numerous laboratory tests that permit the detection of horsemeat, even when prepared in form of sausages or other products. There are many different qualitative and quantitative tests for glycogen, which is present in larger quantities in horseflesh than it is in the flesh of the other food producing animals. A glycogen test is more difficult to carry on in the presence of starch. Further possibilities of inaccuracy are likely when the sample is not fresh, as the glycogen in the flesh changes over very rapidly after slaughter to a reducing sugar which interferes with the procedure of the test.

*Glycogen content in horseflesh and beef, according to age*—(Ostertag)10

| Species | Age of meat | % of Glycogen |
|---|---|---|
| Horse | 3 hours | .700 |
| Horse | 3 hours | 1.026 |
| Horse | 1 day | .373 |
| Horse | 2 days | .603 |
| Horse | 5 days | 1.072 |
| Beef | 4 hours | .204 |
| Beef | ½ hour | trace |
| Beef | 2 days | .000 |
| Beef | 5 days | .076 |

*Relative amounts of Glycogen*—(Leach)8

| | Water | Glycogen Direct | | Glycogen in dry substance | |
|---|---|---|---|---|---|
| | | Niebel Method | Maryhofer Method | Niebel | Maryhofer |
| Horseflesh | 74.44 | 0.440 | 0.445 | 1.721 | 1.741 |
| Horseflesh | 74.87 | 0.600 | 0.520 | 2.388 | 2.069 |
| Horseflesh | 76.17 | 1.827 | 1.727 | 7.667 | 7.247 |
| Veal | 74.16 | | 0.086 | | 0.342 |
| Pork | 75.00 | | 0.186 | | 0.744 |

Wiley states that a safer test for detection of horseflesh than by proving the presence of glycogen, is in the examination of

horsefat. The fat is not so susceptible to change and may be effectively detected even when in finely comminuted state or in mixture with other meats. Horsefat has a lower melting point, a higher iodine number and a higher heat value when mixed with sulphuric acid.

Ostertag refers to Nussberger as finding it possible to determine horsefat by means of a Zeiss refractometer, which found horsefat to have a higher refractive index than that of beef fat.

| Fat | Iodine Value | Butyro—Refractometer Readings Temp. 40° |
|---|---|---|
| Horse | 71.86 | 53.7 |
| Beef | 38.46 | 49.0 |
| Pork | 50.70 | 48.6 to 51.2 |

Horsemeat may also be detected by means of a blood serum usually prepared from a rabbit, that has been sensitized by inoculations with blood serum of the horse or with juice from horsemeat. On contact of this prepared rabbit serum with the juice of horsemeat a reaction takes place.

*Summary.* Horsemeat has been used as a food since ancient times, to the present day, in different parts of the world.

The opposition to the use of horseflesh is mainly as inherited prejudice, arising from early religious restrictions. The opposition on the ground of its peculiar properties is justified. Horsemeat may be considered a wholesome, nutritious and economical food.

Horsemeat should be sold under special regulations, to prevent adulteration and substitution.

Every possible precaution should be exercised to eliminate glanders in horses offered for food.

According to certain writers horsemeat should be prepared in a certain manner.

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# CLINICAL AND CASE REPORTS

"Knowledge is born in laboratories and in the experience of the thoughtful. It develops from in the journals and 'when dead it is decently buried in books'."

## ANTITETANIC SERUM IN ARTICULAR RHEUMATISM

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At times the Veterinary Department of the Experiment Station is called upon to respond, by mail, to inquiries concerning the treatment of animals in the rural districts, especially where no qualified veterinarian is readily available, and the following case, which was one of that kind, may be of interest to readers of the *Journal*, as it was to the writer:

On February 16th, a stockowner wrote that he would like my opinion regarding a very valuable Jack which he had purchased in Kentucky the previous April. "As well as I can see," said the owner, "he has rheumatic spells. Sometimes it is in his shoulder joints; at other times in his stifle; sometimes he is very lame in one front and one hind leg at the same time; and I have done all I could for him."

The treatment which had been given was a purgative, followed by a course of sodium salicylate, with blistering of the affected joints.

This gave temporary relief, but the attacks recurred, with changes in the location of the affection.

As the breeding season was approaching, the owner was, naturally, anxious for the recovery of the Jack, and I suggested a change to potassium iodide, and the use of hot carbonate of soda baths to the enlarged joints.

On March 10th, the owner wrote that the treatment "has worked like a charm." However, on April 26th, he wrote that the animal had again commenced to go lame in the left hind leg; that his stifle was affected; and that he wished further advice; and now comes the part which, to me at least, was quite interesting. In the interim I had met an acquaintance, a man of over middle age, whose occupation required his being in the saddle a great deal of his time. In conversation, he incidentally remarked that he had recently received a severe cut on one of his feet, and was advised by his wife to see his physician and have him inject a protective dose of antitetanic serum, at the same time remarking that he had been quite a sufferer from rheumatism which made it painful for him to mount his horse, especially in the morning, but that since receiving the serum, he had had little or no difficulty in doing so. This immediately brought to my mind the case of the Jack, and I at once wrote to the owner, relating the experience of this man, and suggested that he obtain some serum, for veterinary use, follow the directions accompanying the package, and try it as an experiment on the Jack.

On May 5th, the party wrote that he had given one dose (hypodermically) on the 3rd, and that the Jack was 50 per cent better. He had given the second dose on the 13th, and was to give the 3rd injection on the 25th.

On June 15th, there came a letter to the effect that three doses of the serum had been given, and that he thought the animal was completely cured; "he doesn't limp any more; the fever and swelling have all gone long ago; I am working him right along; and he is in good shape."

I then wrote and asked the party to kindly give me the details, as I might want to use them; and on June 27th, he gave me the following information: "The Jack had been ailing for three months. I have given him three doses, in all, of the serum. I bought a package containing 1500 units and divided it into three doses, making 500 units per dose.

"I injected it as near the joint as possible. I gave him the first dose on May 3rd; the second on the 13th; and the third on the 25th.

"In four or five days after the first injection I began to see a little change for the better. About seven days after the second dose, you just could see that his leg was a little weak; but in ten

or twelve days after the last dose, you could not see anything at all; and now he is in good shape and working better than ever; so I can call him completely cured, for no man living could tell that he had ever been sick.

"I think this is a very valuable trial, and I more than thank you for suggesting the serum treatment, etc."

"One swallow does not make a summer," of course, but this case has interested me considerably, and especially the manner in which the treatment suggested itself. The serum may have been used before in rheumatic affections in veterinary practice without my having observed the records; but if not, it seems worthy of further trial when opportunity offers, as it evidently had a beneficial effect in the case under consideration; although it may be that some other antitoxic serum might have a similar effect.

## A SERUM TEST INFLUENCED BY ASCARIS INFESTATION

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In the routine of serum production it is our custom to use eight pigs that are litter mates for making the tests. Recently we failed to secure the desired number from the same litter, so a test was conducted by using four pigs from each of two litters purchased from different sources. All were white pigs, weighing about sixty pounds each.

Pigs 1, 3, 5, and 8 were from litter No. 1. They were given 2 c.c. each of virus, and in addition pigs 1, 3, and 5 were given 10, 15, and 20 c.c. respectively, of serum. The serum pigs survived the test without incident, while No. 8, the check receiving virus and no serum, was in a dying condition in eight days from the date of injection. As far as this litter was concerned the test was satisfactory.

Pigs 2, 4, 6, and 7 were from litter No. 2. They also were given 2 c.c. each of virus, and pigs 2, 4, and 6 were given serum doses of 10, 15, and 20 c.c. respectively. No. 7 was given no serum and remained as a check. Thus each pig in litter No. 1 was paired with one in litter No. 2 receiving like treatment, yet there was a marked contrast in the reactions to serum and virus doses, of the pigs representing the two litters.

Seven days after receiving the test doses (2 c.c. of virus and

10 c.c. of serum) pig 2 (litter No. 2) showed dullness and loss of appetite. Temp. 103.8°. On the following day these symptoms were intensified and there was chilling. Temp. 106.2°. Examination in a good light revealed jaundice in a marked degree. The pig grew steadily worse and died fourteen days after receiving the serum and virus. Autopsy revealed extensive lesions of hog cholera involving kidneys, spleen and lymph glands. In addition, the small intestine contained great masses of ascarides, and the gall duct was enormously distended, and inflamed. It contained fourteen large worms.

Pig 4, (litter No. 2) developed symptoms nine days after receiving 2 c.c. of virus and 15 c.c. of serum. It too, showed elevation of temperature and the typical train of symptoms that accompanies hog cholera. In addition there was jaundice so marked as to compel notice. Death occurred after eight days of sickness. The only lesions of hog cholera revealed on autopsy were two or three petechiae on each kidney. The small intestine and gall duct were similar in appearance to the same organs in pig No. 2. Six large worms were removed from the duct.

Pig 6, (litter No. 2) received 2 c.c. of virus and 20 c.c. of serum It showed no symptoms other than the usual transient elevation of temperature, and came through the test in excellent condition.

Pig 7, (also of litter No. 2) which received virus only, died eight days after the virus was administered. Autopsy showed extensive lesions of hog cholera, together with the same character and degree of ascaris infestation already described. The parts were preserved as a museum specimen so the parasites in the gall duct could not be counted.

Because the checks receiving virus only showed the pigs in both litters to be highly susceptible to hog cholera; because each pig in litter No. 1 was paired with another in litter No. 2 receiving like treatment; and because the infested pigs receiving the lighter doses of serum died, while pigs free from parasites but receiving the same doses of serum and virus showed no symptoms, it seems reasonable to suppose that the worms were responsible for the difference in results. In a subsequent test in which nine litter mates were used this same serum proved potent in doses graded down as low as 10 c.c. per pig.

It is interesting to consider what would happen in the field

should a herd severely infested with ascarides receive simultaneous treatment. We have frequently noticed that infested pigs, when exposed to hog cholera die much more quickly than normal ones, especially if the parasites have entered the gall duct. Often death takes place before lesions of hog cholera appear, so that in the field one may easily be misled into attributing death to parasitism when it is really due to the combined action of parasites and hog cholera virus, the latter being the chief offender It is very doubtful, though, if any ascaris infested pigs would die as a result of simultaneous treatment if full doses of serum were administered. Even in this litter where the degree of infestation was extreme, the pig receiving 20 c.c. of serum survived and did not even show symptoms. It is possible, though, that it was an exception to its litter mates in not harboring any of the parasites. All things considered, it is very probable that disastrous results would follow simultaneous treatment of pigs badly infested like those in litter No. 2, if light doses of serum, so often unconsciously given as a result of underestimated weights, were administered.

In previous tests we have sometimes used litters in which the checks, at least, showed a few ascarides in the small intestine, and no unusual results have been observed. In none of these tests, though, have we happened to use pigs harboring so many of the parasites in the gall ducts, although from time to time we have found virus pigs as badly infested as the ones described. It is by no means uncommon to find the gall ducts greatly distended and packed with the parasites. In the pigs we have observed, both in the laboratory and in the field jaundice has in almost every instance been due to the presence of ascarides in the gall duct. It is probable that at the time the pigs in litter No. 2 were injected, a close examination in good light would have revealed jaundice.

## ACUTE INTERSTITIAL NEPHRITIS OF THE EQUINE

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A disease fatal to suckling colts came to our attention during the spring of this year. Owing to the nature of the disease and its reported appearance in many sections of the state of Michigan, it

is important that the cases observed and studied by us should be reported.

The first case observed was that of a colt foaled at the Michigan Agricultural College on the night of April the 30th. The dam of this colt was in excellent condition and had been doing light work up to and including the day preceding the birth of the colt. She was fed a ration consisting of sound clean oats, mixed clover and timothy hay. After foaling, the dam and foal had the run of a grass paddock with a little bran at first, later light daily feeding of oats. The foal was normal in size and development, in good flesh and was able to get up alone, but walked a little unsteady. Immediately after birth the umbilicus was disinfected with tincture of iodin and afterwards with an antiseptic dusting powder. The first passage of the bowels was normal, but afterwards fecal passages were obtained only through the use of castor oil or rectal injections. There was no urination and the catheter was passed on June 2nd. The urine was somewhat cloudy and thickened in consistency. After the use of the catheter the colt was able to urinate without assistance, but there was almost always straining to urinate when standing and an apparent polyuria. After the first two or three days the colt was unable to get up without assistance and remained standing but a short time when put on its feet. There was no elevation of temperature, appetite remained good, but the colt lost flesh rapidly. There were edematous swellings of the stifle joints. The colt eventually became so weak that it could not stand when placed on its feet and was killed on the night of the eighth.

Upon autopsy there was the distention of the hock and stifle joints with a clear straw colored fluid in which there were a few flakes of fibrin(?) There was an acute fibrinous epicarditis, and parenchymatous degeneration of the liver. The kidneys were enlarged and hyperemic and numerous greyish-yellow sharply circumscribed areas were visible in the cortex, varying from one to three millimeters in diameter (acute interstitial nephritis).

The second case was that of a colt from the same source as the preceding case.

The dam of this colt was not at work, but was in pasture without grain. She was somewhat thin but in thrifty condition. This colt was foaled on the night of May 7th. The umbilical cord was treated in the same manner as described in the preceding case. The colt was very large, well formed and in excellent condition.

In fact the farm superintendent remarked that it was the finest colt he had seen in several years. There was a normal passage of the meconium, but subsequent action of the bowels was obtained only by the use of castor oil or rectal injections.

The colt did not pass its urine so the catheter was passed on the evening of the 8th at which time a thick syrupy urine was drawn. After the passage of the catheter there was a polyuria without assistance.

On the third day the colt became very weak, was unable to rise upon its feet without assistance. There was a considerable elevation of temperature, and constant straining to urinate. The colt rapidly lost weight and was unable to stand the last two days. The colt succumbed on the night of May 12th.

Autopsy—Petechial and ecchymotic hemorrhages under epicardium and endocardium. Parenchymatous degeneration of heart and liver. Kidneys swollen, hyperemic and numerous greyish- yellow foci in corte varying from one to three millimeters in diameter (acute interstitial nephritis).

In view of the fact that the clinical symptoms and the autopsy did not reveal the etiology of the peculiar disease, guinea pigs were inoculated intraperitoneally with one cubic centimeter of the heart blood and one cubic centimeter of a salt solution emulsion of a portion of the kidney of the colt. The pigs were found dead ten hours after the injection. Autopsy revealed considerable hyperemia in all organs. Smears of the heart blood were made on agar slants. The only organism isolated possessed the following characteristics:

Morhpology — Bacterium, 5 x 1 mierons, bipolar, young cultures show tendency to form chains. Gelatin—No liquefaction. Milk—Coagulated (slowly). Litmus milk—Reduced. Agar slant—twenty-four hours at 37°C. isolated greyish-while colonies, becoming confluent; condensation water turbid and tenacious. Gas—No gas in dextrose, lactose, saccharose, maltose, mannit or glycerin bouillon.

Acid—In dextrose, lactose, saccharose, maltose, mannit and glycerine bouillon. Potato—Slimy growth.

Pathogenesis—Subcutaneous and intraperitoneal inoculation cause death in guinea pigs in ten hours. Post-mortem revealed considerable hemorrhage in all organs. Bacterium isolated from the heart blood. Rabbits refractory to doses which kill guinea pigs.

Thermal death point—63°C. for ten minutes.

On the 15th of May a six months old bull calf was given an intravenous injection of the washing from one agar slant of this organism. On the same date a very old horse was given an intravenous injection of washings from five agar slants of the same organism. The temperatures of the horse following the injection are recorded as follows: four hours after injection 102.9°F., six hours after injection 103.°F. On the 16th, 104.8°F., pulse 96, respiration 56. The horse refused to eat or drink and stood with head drooping. There was polyuria accompanied by hematuria. A blood sample drawn from the jugular on this date was examined microscopically and bacteriologically for the presence of an organism, no organism was found. The horse died on the 18th at 4 a. m.

The autopsy revealed numerous ecchymotic hemorrhages in lungs. Bronchial and mediastinal lymph glands injected. Ecchymotic hemorrhages under epicardium and endocardium. Parenchymatous degeneration of myocardium. Liver showed marked venous congestion. Kidneys were swollen and hyperemic. There were numerous sharply circumscribed greyish-white areas, varying from one to three millimeters in diameter appearing in the cortex (acute interstitial nephritis). An examination of the spleen revealed numerous petechial hemorrhages. The mesenteric, hepatic and renal lymph glands were injected.

The organism injected was isolated from the heart blood and kidney in pure culture.

The calf began to react one hour after the material was injected. The temperature rose to 104°F., accompanied with rapid pulse, labored breathing, salivation, profuse diarrhea and polyuria. The calf gradually became weak and five hours after the injection was unable to stand alone. On the 16th, the calf seemed to show improvement over the previous day. The temperature was normal, but the labored breathing and salivation still persisted. On the 17th, 18th and 19th the temperature rose to 104°F. The calf grew thin and weak. The appetite was very poor. On the 21st there was a noticeable distention of the hock and metacarpal joints with synovial fluid. This condition persisted until June 14th on which date the calf was killed for further examination. The only pathological alterations observed were considerable infiltration of the ligaments of the hock joints and a slight erosion of the articu-

lar surface of these joints. The lower ends of the metacarpal bones were slightly enlarged, but the articular surfaces were not involved.

A bacteriological examination of the synovial fluid revealed only a large micrococcus. A bacteriological examination was made of the blood from the calf on several occasions. No bacteria were found.

There appears to be no literature published on the subject. Hence, in view of this fact we hesitate to discuss or classify this peculiar organism at present. Further study is being made of the organism in this laboratory.

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A culture of the organism was sent to the Department of Pathology, Bureau of Animal Industry, Washington, D. C., for the purpose of identification. The report is as follows:

*Morphologically.* The organism is a coccus of about .7 to 1 micron in diameter occurring singly, in pairs, and sometimes in groups. It is an aerobic, facultative anaerobe, and takes Gram's stain.

There is a luxuriant growth on agar in 24 hours at incubator temperature. The rapidity of growth is somewhat less at room temperature.

*Cultures. Bouillon.* Clouds whole medium, clearing somewhat after several days, leaving a considerable amount of flocculent sediment. Forms pellicle.

*Agar slant.* Luxuriant milky white spreading growth. Individual colonies are round, slightly raised with smooth surface, weakly refractive, translucent, of homogeneous structure and having entire edge. In the original culture the growth appeared to be somewhat tenacious and adhered to the medium. This character did not obtain in the first or subsequent transfers.

*Potato*: No visible growth.

*Milk*: *1st 24 hours,* No change; *2nd 24 hours,* Same; *3rd 24 hours,* Slightly thickened; *4th 24 hours,* Coagulated, clear whey.

*Litmus Milk*: *1st 24 hours,* Slightly acid; *2nd 24 hours,* More acid; *3rd 24 hours,* Decidedly acid; *4th 24 hours,* Same.

*Gelatin stab.* Diffuse colonies along line of stab. In about a week, begins to liquefy and continues very slowly as crateriform liquefaction.

*Serum slant.* Luxuriant white spreading growth, no liquefaction.

*Dunham.* No indol produced.

*Fermentation tube, dextrose bouillon.* Clouds both neck and arm of tube. No gas.

*Lactose bouillon,* same, acid produced.

*Saccharose bouillon,* same, acid produced.

*Pathogenesis:* Guinea pigs, rabbits, white mice and white rats proved refractory to both subcutaneous and intraperitoneal injections of heavy suspensions of the organism. (One white rat died 6 days after inoculation of an intercurrent malady).

Regarding the identity of this organism, none of the available data consulted revealed an organism of similar morphologic, staining, cultural and pathogenic properties.

## A TUMOR ON THE MEMBRANA NICTITANS

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Patient was a well bred Beagle bitch, about one year of age, and in good physical condition.

*Symptoms.* The animal showed some conjunctivitis, with a discharge of pus on the skin at the inner canthus. There was some photophobia and the animal occasionally rubbed the eye with the front paw. The membrana nictitans was protruded somewhat and on closer examination of the inner part of the membrane a pink red tumor, about the size of a pea, was noticeable. This tumor formation is an enlargement of Harder's gland, probably brought on by some traumatic irritation.

*Treatment.* The eye was washed with a solution of boric acid and the secretions and pus removed from the inner canthus. A few drops of a four per cent solution of cocaine were dropped into the eye, the lids closed and gentle massage applied in order to anaesthetize the conjunctiva as much as possible. After waiting a few minutes the membrana nictitans was grasped with a pair of fine forceps, pulled upward and outward, and clipped off with a pair of curved scissors. Cold boric acid packs were applied for about five minutes to check all hemorrhage and the patient discharged.

# "THE SUSCEPTIBILITY OF THE PRAIRIE DOG TO RABIES"*

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The significance of this paper does not at once present itself even to those most familiar with the prairie dog as constant neighbors. In fact, it was not apparent to the writer until three of these animals were presented to the laboratory as substitutes for rabbits. The vicious temperament and apparent intractability led us to suspect that they would make good subjects for experimental rabies. They were therefore set aside for observation and treatment.

Having but three animals it was decided to keep one for control and attempt, if possible, to establish a certain degree of immunity in the others so that some check could be had upon the action of the virus to which the animals were to be ultimately exposed. It was also believed that the course of the disease could be observed more intelligently by proceeding in this manner.

The following gives the result of this experiment in detail:

*Animal* No. 1; *Weight*, 1350 grams; *Antirabic Vaccine*, Special P. D. & Co. Experimental product; *Exposed*, 21 days after last injection of vaccine. Intracranial injection of 0.2 c.c. fresh virus; *Paralysis*, 13th day; *Remarks*, Died 16th day of rabies. Animal extremely nervous and very vicious during treatment. Following inoculation irritability increased, would attack dogs and had to be kept in closed cage.

*Animal* No. 2; *Weight*, 1140 grams; *Antirabic Vaccine*, Special P. D. & Co. Experimental product; *Exposed*, 21 days after last injection of vaccine. Intracranial injection of 0.2 c.c. fresh virus; *Remarks*, Immune to date (5-18-17). Nearly three months after death of other animals.

*Animal* No. 3; *Weight*, 1075 grams; *Antirabic Vaccine*, (control); *Exposed*, 21 days after last injection of vaccine. Intracranial injection of 0.2 c.c. fresh virus; *Paralysis*, 10th day slight paralysis right leg. 11th day coming down; *Remarks*, Died 13th day following inoculation.

It will be seen from the foregoing table that a fairly typical rabies infection may be suspected. The subsequent inoculations from the brain of these animals gave corroborative results.

It was not intended that this report of rabies in the prairie dog should be considered as final. Neither was it intended to be particularly of a rabies immunity problem. There are too many

*Presented before the March meeting of the Michigan State Academy of Sciences at Ann Arbor, Mich.

technical considerations to be allowed for such a problem on so few animals, as unrecognized protein reactions, meningeal symptoms from other than rabic causes simulating rabies, and a total lack of extensive experiments on these animals with which the present series may be compared.

A thorough search of the literature fails to show any previous record of rabies infection among prairie dogs. Nor are we able to ascertain whether this branch of the marmot family has been studied with any special reference to health problems. It is well known that other species may be easily infected and marmots in Asia and the western slope of the Rockies have been studied with reference to the plague problem.

Prior to 1914 when Henry W. Henshaw, Chief of the Biological Survey of the U. S. Government, reported his studies of the marmot, the relationship and ranges of many of the species of this rodent were quite imperfectly known.

Economic reasons were the cause of various investigations. In 1900 the Bureau of Animal Industry furnished an extensive review of losses endured by cattle men of the Southwest on account of the destructive effect of the prairie dog upon their grazing lands by their extensive colonization. The review was followed by many important articles during the succeeding twelve years but no hint of the health problem was mentioned. This seems almost incredible in view of the well known temperamental morbidity of these animals with their "nasty" tempers. In spite of its social exclusiveness and apparent timidity, so well known, the animal shows a marked disposition toward viciousness.

The prairie dog or prairie marmot (Cynomys) of which the best known species is *Cynomys ludovicianus* is closely related to the squirrel, chipmunk, rat, Cavidae, porcupine, hare, gopher, chinchilla, wood-chuck, and other species of the rodents.

Of this order it shows anatomically marked resemblance to all the various species and physiologically identical characteristics.

They are essentially a "social" animal living in immense colonies ranging from a few acres to thousands of square miles in area, the population averaging from 35 to 64 per acre. They are not easily captured and when taken they remain long savage and intractable. They may be tamed, however. Efforts to tame the animals reported in this paper, failed during a period of several years and no laboratory experiments could be undertaken with them because of their consistent ugliness.

Their natural enemies are the coyote, badger, black-footed ferret and a few denizens of the arid regions, among which may be named especially the owl and the rattle snake, both of which feed upon the young and receive no mercy from their very harmless looking captors who bury them in their holes when possible.

The prevalence of rabies among coyotes has recently been the subject of serious legislation and health department control in the west and the facts in the foregoing paragraph indicate how easily rabies may be spread among prairie dogs by these or other enemies, and thence to animals which might come in contact with them offensively. When it is borne in mind that their instincts lead them to almost heroic attempts at self preservation when attacked or angered, this becomes doubly apparent.

It is hoped this paper will lead to further studies by others on the marmot family as related to rabies. Certain problems closely related to it will be the subject of later reports from this laboratory.

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## INTESTINAL INTUSSUSCEPTION IN CATTLE*

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CASE NO. VII. A six year old Jersey cow was operated upon the sixth day. This patient died from necrosis of the sutured area. Parts probably were too much devitalized and it appears that rather more intestine should have been resected in both direections. Actual part removed was about four feet long.

*Cases No. I–IV were published in the March issue (1915) of the American Vet. Review. Cases No. V–VI were reported in the December issue (1915) of this Journal of the A. V. M. A.

CASE No. VIII. This patient was an eighteen months old Jersey heifer. Three feet of small intestines were removed and recovery was complete.

CASE No. IX. A four year old black and white grade cow was operated upon five days after attack. Upon opening the abdominal cavity and manual exploration it was found that the portion of intestine affected was held fast by a ligament in the right inguinal region. This had to be separated by traction in order to deliver the intestine into the wound. This was found rather firm and containing masses of feces of clay-like consistency. After massaging the contents out of this loop in a posterior direction the coil was reposited in the abdominal cavity and the wound closed. The bowels opened up within twelve hours. Recovery was uneventful.

CASE No. X. A three year old fattened bull was to be slaughtered when he showed signs of colic. This was put off for the next day. As he had not eaten since the attack, we were called and the diagnosis of intussusception was made. The bull was slaughtered under inspection. The portion of intestine affected measured four feet.

CASE No. XI. A nine year old red dairy cow was operated upon and had six feet of the small intestines removed. She made a good recovery, filling the pail night and morning this day (4th month after operation).

CASE No. XII. A black grade cow, twelve years old, in poor condition, had four feet of intestines removed. Death followed after three days.

CASE No. XIII. This patient was a six year old cow. Upon opening the abdomen a large quantity of fecal liquid escaped through the wound. Manual exploration of the abdominal cavity brought to light a portion of intestine that was completely separated from continuity by a process of necrosis. How this necrosis occurred the writer is unable to account for. This case was of course hopeless and the cow was destroyed on the spot.

While CASES NOS. IX AND XIII do not come under the heading of intussusception, they have found a place here for differential diagnosis. They had in common with typical cases the following: 1. Sudden attack of colic. 2. Loss of appetite. 3. Apparent constipation. 4. No bloating. 5. No fever. 6. Mucilaginous and sanguinous exudate in rectum with absence of feces. (Fecal matter with exudate and blood may be present or absent in typical cases).

All the cases were operated upon in the standing position. Chloral hydrate ℥ i in a quart of water before the operation and repeated if necessary is given as an anodyne. Cocaine is now used around the area of incision after Dr. Frost's case in the February number (1917) of this *Journal*. The incision is made in the right flank nearly vertical, or rather inclining forward ventrally. No. II catgut was used for the intestines and peritoneum, silk for the skin and wounds.

## ABSTRACTS FROM RECENT LITERATURE

GASTRIC AND INTESTINAL TYMPANY AND SIMPLE AEROPHAGY. J. Bouwman. *Veterinary News.*—An army horse was suffering with abdominal distention. His history showed that: several times a day he had shown peculiar actions, he opened his mouth, moved the tongue, nodded his head, then bent it towards the breast but did not seize the manger with his teeth as a cribber does. After acting this way several times, he had distended abdomen but no colicky pains.

This was his last condition, tympanitis and no colic. He was ordered walking exercise. The distention increased and then colic made its appearance. Arecoline was given followed by creolin. Recovery.

The gastric and intestinal troubles were likely due to aerophagy, (wind sucking). LIAUTARD.

RUPTURE OF THE PERFORANS TENDON. J. Bouwman. *Veterinary News.*—Record of two cases. In the first, the horse had been neurotomized on the near fore leg. The accident occurred suddenly. Some fourteen days before, the horse held the toe of the foot a little distance from the ground and two or three days before had showed lameness. His symptoms were: the sole did not touch the ground and made an angle of 45 degrees with it. The leg rested on the heels and the pastern was much thicker than that of the other leg. At post mortem, the perforans tendon was found ruptured below the navicular bone and a piece of the bone was torn and attached to it.

In the second case, the horse had been lame on the near fore foot and unable to work. For three months it had been noticed that during walking the sole was turned upwards and the heels were

much rested and pressing on the ground. At the postmortem, a total rupture of the tendon near the navicular bone was found. There was ossification on both ends of the ruptured tendon.

LIAUTARD.

OROKINASE AND SALIVARY DIGESTION STUDIES IN THE HORSE. C. C. Palmer, A. L. Anderson, W. E. Peterson, and A. W. Malcomson. *The American Journal of Physiology*, Vol. XLIII. No. 3, page 457.—Orokinase makes active the inert saliva emptied into the mouth from the salivary glands. It is produced by the buccal glands, and possibly by the lingual glands. Buccal, lingual, and salivary glands were extracted with 50% glycerine. Mixed saliva was collected from the mouth and also through an esophageal fistula. Extract of the buccal glands is shown to have activated saliva from a parotid fistula and extracts from the different salivary glands. Mixed horse saliva (1–10), 2 drops taken activated fistula saliva. Two drops of human saliva (1–50) is also shown to have the same activating power. Bacteria of the mouth do not contribute to starch digestion, neither do they possess any activating properties. It was demonstrated in seventeen horses that mixed saliva possesses amylolytic properties and that when a good sample could be obtained that the amylolytic action was about as powerful as that of human saliva. Saliva that was easy to obtain gave better results than samples more difficult to collect. Mixed secretions collected through esophageal fistúlae were of uniform potency. Mixed samples from the mouth were not uniform. Mixed saliva compared with human saliva showed that the two were of about equal activity when acting on cooked starch. Horse saliva is more active upon raw corn or oat starch. A diet of raw corn or oats escaping from the esophageal fistula shows a heavy reduction when tested with Fehling's solution, whereas the grain itself or the horse saliva possesses no reducing properties. The amount of complete starch conversion taking place in the mouth was not as great as was anticipated. Dr. C. C. Palmer proposes the name orokinase for the enzyme which activates the saliva. HAYDEN.

ETIOLOGY OF INFECTIOUS ANEMIA OF THE HORSE. Carré and Vallée. *Recueil de Médécine Vétérinaire*, Vol. 92, pp. 193-199, 1916. Long and painstaking researches carried out by several investigators made it possible, about a dozen years ago, to state precisely

the principal points in the history of infectious anemia of the horse. Following is a résumé of the principal results of our researches:

1. Pernicious anemia of the horse is an infectious disease, inoculable, and due to an ultra-microscopic, filterable virus.

2. The blood and urine of the affected are virulent.

3. The virus is destroyed by heating to 60°.

4. Infection usually takes place by way of the digestive tract; urine being the source. (Urine from the affected horses contaminating the feed, drinking water, etc.)

5. Horses that have recovered apparently, remain, in reality, infected and spread the contagion around them.

These fundamental facts have received wide confirmation; placing them beyond any serious criticism. This would not have been mentioned were it not for the fact that certain periodicals, without any criticism have published the works of K. R. Seyderhelm and R. Seyderhelm, which to us appear to be contrary to the facts and detrimental to the success of prophylactic measures under consideration.

We believe it advisable to discuss the facts reported by them because the *Recueil de Médécine Vétérinaire* for January 1916, presents their conclusions together with extensive comments by Ries.

According to Seyderhelm and Ries, pernicious anemia is not caused by an ultramicroscopic virus but by a poison, oestrine, contained in the flies of the horse (*Gastrophilus equi* and principally *Gastrophilus hemorroidalis*). This conclusion is based on the assertion that an aqueous extract of the larvae, when injected into horses, produces acute, fatal accidents or chronic affections, which are progressive, anemiating and febrile.

We have not been able in several attempts to observe this interesting property of flies, obtained from anemic or healthy horses; nor has the Japanese Commission been more fortunate.

We agree with Ries and Seyderhelm that there exists in the horse, anemias of verminous origin, i. e. due to gastrophilus, strongylus, etc. But we refuse to admit the verminous etiology of pernicious anemia of the horse. We regard as demonstrated by our works and by the numerous confirmations they have received, *that there exists in this species an infectious anemia of inoculable, microbial nature, due to a filterable virus.*

The following facts support the affirmation without reserve or room for doubt: 1. Most of the anemic horses received at our laboratory carried neither Oestrus nor verminous aneurisms. While infectious anemia is distributed over a limited geographical area. Oestrus and Strongyles are found in abundance in innumerable horses in a state of health and in regions where infectious anemia never existed or is observed no more.

2. The "poison" of Oestrus, discovered by the Seyderhelms withstands heating in the autoclave for 1½ to 3 hours. Our work has shown that the virus of infectious anemia is destroyed by heating to 60°. This was confirmed by Marek, Ostertag and others.

3. Infectious anemia is transmissible by simple inoculation of blood from affected animals without the mediation of Oestrus or of oestrine. In our work the same virus was successfully passed 5 times from horse to horse.

Following are the best established points in the etiology and diagnosis of this particularly insidious infection. 1. The malady is transmissible by way of the digestive tract. The blood and urine of affected animals are virulent. A permanent source of infection is furnished by watering troughs that have become contaminated by stable drainage. The virus of anemia resists dessication and putrefaction for a long time.

2. During the course of its chronic evolution, anemia presents the following: violent fever, hematogenous icterus, hemoglobinuria, red cells are agglutinated; the serum is strongly colored or dichroic. In the interval between crises, the malady can be detected only by an examination of the urine which always contains albumin, examination of the heart and also the conjunctivae which appear thickened,pale and infiltrated. On autopsy one notes enlarged spleen and liver, endocarditis and a vigorous hemopoietic reaction of the marrow of the long bones.

3. Subjects that are apparently cured remain infective for months and years. Whatever success is obtained by the various treatments is problematic—the real recovery is characterized by non-virulence of the blood.

4. The separation, the surveillance of the affected animals, the disinfection of the dejecta, and the protection of the drinking water are imperatively indicated. The destruction of affected animals and of their carcasses are indispensable prophylactic measures, especially in the field.

5. All attempts at vaccination or serotherapy have up to the present been unsuccessful. BERG.

MAMMITIS IN COWS. J. J. Cosgrove, M.R.C.V.S. and William Scott, F.R.C.V.S. *Veterinary News.*—A cow had had three calves and was now pregnant. She was due to calve in three weeks. Ailing, she had hurried respiration, pulse 85, temperature 106°F. There was marked crepitus in the left lung. The right posterior quarter of the udder was swollen, hot and painful to the touch. The gland secreted a thick yellow material. The treatment applied was a mustard poultice on the chest, steaming, saline water to drink, and fomentations on the udder. The cow seemed to be worse the next day. Mammitis was characterized and vaccine treatment prescribed. Six ampoules were prepared with the material carefully obtained from the udder. The ampoules contained streptococci, staphylococci, albus and aureus. With the local treatment to the udder, the ampoules were injected as soon as they were made. A second injection was again made four days later, a third five days after and a fourth also when the condition had so much improved that the cow was declared convalescent. The two last ampoules were given later a week apart. Some abscesses had formed but the swelling of the udder gradually subsided and the cow and her calf reported doing well. LIAUTARD.

AN INTERESTING CASE. A. Spruell, Sr., F. R. C. V. S. *Veterinary News.*—Subject—A four year old cob gelding bolted while being driven and ran into a heap of stones. Result: comminuted fracture of the pastern and coronet of one hind leg. The parts were reduced to absolute pulp without breaking of the skin. The region was bandaged and the horse put in slings, while considering if the horse was worth treating. The decision being in its favor, the temporary bandage was taken off and replaced by a plaster dressing after careful preparation of the region. No more attention was paid to him and nature was left to care for him. After twelve or thirteen weeks in the slings the horse began to use his foot. After a time he was able to walk, to resume his work with only a slight stiffness. He finally became perfectly sound and able to perform his work, which he did for many years after. LIAUTARD.

AORTIC ANEURYSMS IN DOGS WITH THE REPORT OF SIX CASES. S. R. Haythorn, M.D., Pittsburgh, Pa., and A. H. Ryan, M.D., *Jour. of Med. Research*, Vol. XXXV, No. 3, Jan. 1917, p. 411.—Aortic aneurysms in dogs are interesting not only because they are rare and have been studied relatively little, but also because they furnish good material for the study of medial disease, especially with reference to the pathological processes leading up to aneurysmal dilatations.

Somewhat over a year ago one of us (A. H. R.) accidentally came across the first of the aneurysms in the aorta of a dog which was being used in connection with the work of the department of physiology of the University of Alabama Medical School at Mobile. Following this finding careful examination was made of every dog which died in the department, with the result that five more well-developed instances were found. A seventh case was mistaken for an aneurysm until it was opened; when it was seen that the dilatation of the lumen was very slight and that the apparent enlargement was due simply to a nodular growth in the adventitia.

From the above data we have reached several conclusions:

1. The dogs in certain localities of the United States are infected with an oviparous nematode, *Spirocera sanguinolenta*.

2. This worm is prone to attack the walls of the aorta and cause a type of medial disease which leads to the development of aneurysms.

3. Successful inoculation of dogs with this parasite would afford an excellent method of studying experimental aneurysms.

4. Unrecognized *Spirocerca* lesions of the healed type might give rise to very erroneous conclusions if they occurred accidentally in dogs used in the experimental production of aortic lesions.

REICHEL.

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AN INTERESTING CASE OF FIBROMATA. Capt. J. F. Tutt, A.V.C. *Veterinary News*.—A seven year old black gelding had been malleined with negative results. On account of obscure lymphangitic manifestations. These were on the near fore leg. The whole region from the point of the elbow to the lower third of the shank was covered with eruptions, some of which had broken off and left ulcers. Those which had not, looked like small subcutaneous fibromata. The lymphatic vessels were cordy as those of farcy, some extending to the neck, others to the axilla. It was decided

to treat the broken lesions as in some cases of epizootic lymphangitis. Examination of the material obtained from freshly opened lesions excluded the diagnosis of epizootic lymphangitis as neither the Rivolta's cryptococci nor the Preisz-Nocard bacillus were found. The animal was treated for some time and it looked as if recovery would be obtained but the improvement was only temporary and the horse was destroyed showing at the post mortem that the liver was full of tumors similar to those of the skin. LIAUTARD.

UNUSUAL CASES. G. Jones Roberts, F.R.C.V.S. *Veterinary Record.*—These might as well be recorded as unfortunate cases—for certainly they were.

Case 1—Four year old Shire mare gave birth to twin foals. Both were dead, both had crooked legs. About a year after the mare had a difficult foaling due to hydrocephalus. Asked for advice as to rebreeding from the mare, pure coincidence was answered and the mare went again in foal. This time, she had a head presentation with no feet coming. Attempts to find the fore legs failed and the foal was extracted by force without ropes. There was not a vestige of fore legs. The hind legs appeared longer, and the foal was jumping about on his sternum. On post mortem, the scapula was found present on both sides and at its end was rounded off like a cricket ball.

Case 2—Farmer called and asked for ointment to remove warts from a Shire mare above the eye. Notwithstanding full instructions it was used carelessly and some of the ointment went into the eye. The organ was lost. At that time the mare was pregnant. When she delivered, the foal had only one eye on the same side as that of the dam. The mare, dam and granddam originally had all their eyes perfect. LIAUTARD.

RINDERPEST. PREPARATION OF ANTI-SERUM. A. W. Shilston. *Bulletin No. 64,* Agricultural Research Institute, Pusa, India.—Immune bodies are present in full amount in eight days after the injection of rinderpest blood and potassium citrate solution into susceptible animals. The first bleeding for serum in hyperimmune animals may be made in eight days. Three bleedings at the rate of 6 c.c. per pound body weight taken on the 8th, 12th and 16th days yielded a mixed serum equal, in case of hill bulls, and increased, in case of buffaloes, in potency when compared with the

mixed serum of two bleedings. The two bleedings were made in 15 and 17 days at the rate of 6 c.c. and 8 c.c. per pound body weight. The three bleedings system gave an increase of 2.81 c.c. of serum per lb. body weight. The increase is 41.4 per cent over the former output. With an average issue of 500,000 c.c. of serum per month the increase in quantity is made with a very large reduction in the cost of production. HAYDEN.

INDUCTION OF PREMATURE LABOR IN MARES AND COWS. W. Scott, F.R.C.V.S. *Veterinary Record.*—This is indicated in cases where the life of the offspring had to be sacrificed for that of the mother. The modus operandi used by the writer is that of puncture of the membranes with a trocar after manual dilation of the os. The result is that labor pains may follow very soon after the operation or be deferred for several days. The manipulations are the same for either mares or cows. Artificial labor is indicated when the dam is suffering from wasting disease, the gravid uterus acting as an aggravating factor in cases of chronic kidney disease, hydrops amnii uterine hernia, deformity of the maternal pelvis interfering with the passage of the offspring. Five cases are recorded by the author. One in an aged blood mare, seven months pregnant, operated and aborted 33 hours after, perfect recovery. Another, a Guernsey cow, eight months pregnant, having extensive uterine hernia. Operated she had labor pains after four days, was delivered of a calf that lived a few hours. Recovery followed. A third case was that of a Short horn cow with hydrops amnii. Punctured, she was delivered of a dead calf 44 hours after. Turned out to grass, the cow did well. The fourth case is that of a pedigree cow with extensive dropsy of the ammnion. She was very low in condition. Punctured, she died before delivery. The last case is an aged milch cow, with extensive hernia. Operated, she died, having heart disease of long standing and chronic pulmonary emphysema.
LIAUTARD.

HORSE-SICKNESS OF RHODESIA. *The Lancet,* No. 4882, March 24, 1917, Vol. CXCII, p. 462.—In the Rhodesia Agricultural Journal, Mr. L. E. W. Bevan, M.R.C.V.S., Government veterinary bacteriologist, refers to this disease which affects horses and mules, and caused a loss of 30,000 to the colony in the year 1911. It is due to an ultra-visible virus contained in the blood, exudates, and bron-

chial secretions of animals affected. It is communicable to dogs by inoculation and by feeding upon infected meat. Animals that recover from the disease acquire a certain degree of immunity, but this is not complete against reinfection. Theiler found that "the serum of an immune animal which has periodically been immunized acquires immunizing properties". The immunizing of mules against horse-sickness has been practiced in the colony since 1895. This is done by a simultaneous injection of serum and virus, and Southern Rhodesia has derived enormous advantage from it.

REICHEL.

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MULTIVESICULAR HYDATID CYST OF THE LIVER. F. Dévé. *Revista de la Asociacion Médica Argentina*, v. 26 (148), Margo, 1917, p. 143 et seq.—This paper is of considerable interest to medical men and zoologists, sustaining, as it does, a somewhat unusual thesis in regard to the nature of the hydatid cyst and outlining certain medical principles on the basis of that thesis. Any statement in regard to hydatids coming from Dévé is worthy of consideration, as there is no better authority on this subject.

Dévé states that every multivesicular hydatid cyst is one which has suffered, and that endogenous budding is a defense reaction on the part of a parasite vitally menaced. The customary belief is that these daughter-bladders in the hydatid represent the typical, normal development, in fact, a terminal stage of complete development, though some writers have differentiated these forms from the ones with a single vesicle under a different specific name. Dévé regards the simple fertile cyst, with its content of brood capsules, as the typical, normal hydatid. He takes issue with the opinion that internal and external daughter-bladders both arise from islands of germinal membrane between the layers of the thick wall of the simple hydatid cyst, and recapitulates his earlier work showing that only the external daughter-bladders have a cuticular origin, the internal bladders having an endovesicular origin. These internal bladders are derived from the germinal membrane, either directly, a rare condition, or indirectly at the expense of the brood capsules by "cuticularization" of these elements, or of the scolices by vesicular metamorphosis of these elements, the last named being far the more common origin.

So long as the vitality of the simple hydatid cyst is not lessened by senescence or undiminished by external aggression, so

long as the intimate biological conditions of the cyst are undisturbed, just so long will the cyst retain its limpid content, its tension, its brood capsules attached to the germinal membrane, in a state of repose; in a word, it remains quiescent. It continues to enlarge and may contain 3 to 4 liters of fluid without a single daughter cyst. But if it is subjected to some injurious stimulus, sudden or gradual, the cyst functions in a defensive manner through the formation of cuticular elements to the production of daughter-bladders. The latter is then a form of resistance of the hydatid elements, destined to assure the survival of the parasite and, in a measure, the perpetuation of the species.

It is interesting to note that this defense reaction is particularly the function of the scolices, elements which are completely individualized, independent, resistant and active. Yet these elements, well protected as they individually are against untoward and adverse circumstances, differentiated into the initial element of the succeeding sexual stage, are all prepared to undergo the banal transformation into the asexual cyst when the life of the hydatid is threatened. So well prepared are they that less than 40 hours after the intervention of some disturbing stimulation, the scolices will have begun their cystic metamorphoses.

One of the causes leading to endogenous cyst formation is the natural senescence of the germinal membrane, the arrest of development of the simple hydatid cyst by the inextensibility of a thick fibrous pocket, at times more or less calcified, or the death of the hydatid cyst by spontaneous involution. Dévé takes the position that the injury and death of the mother vesicle are the causes of endogenous cyst formation, and not the results as is commonly stated; that internal cyst formation is not a normal condition which is carried to the point where it kills the distended mother cyst.

Other causes leading to internal cyst formation are vicissitudes, natural or artificially provoked, to which the hydatid is subjected, the chances and frequency of such unfavorable occurrences increasing with the age of the host. The unfavorable elements may be mechanical, such as the evacuation of the hydatid fluid, toxic, such as injections which are insufficiently parasiticidal or the action of bile in the perivesicular space, or infectious, such as perivesicular sepsis or septic cholerrhagia. Puncture, for evacuation or injection, acts directly on the internal germinal membrane;

the other causes act from the exterior on the mother cyst. The evacuation of the cyst may be spontaneous, or it may be by medical puncture, exploratory, evacuative or for parasiticidal injection. Whether evacuation is spontaneous or from medical puncture, it is frequently followed by internal cyst formation. This cyst transformation of the scolices probably arises from various causes following evacuation of the hydatid liquid, among other things the diminution of the hydatid tension and the biochemic modifications of the vesicular liquid may be etiological.

The unfavorable action of bile is noted above as a cause of internal cyst formation. The thick walls of the simple hydatid are often permeable to bile as far as the germinal membrane, nevertheless prolonged contact with bile will injure or ultimately kill the mother cyst. Suppuration, usually of hematogenous origin, may have the same effect. It is just possible that intercurrent diseases of the host, especially the febrile diseases, may have an adverse effect on hydatids but this is a point on which we have little data.

Dévé gives an admirable comparative table for the pathological anatomy, symptomatology, evolution and complications of the simple and the multivesicular hydatid. M. C. HALL.

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—It is reported that Dr. David E. Buckingham, Dean of the Veterinary Department of the George Washington University, has been asked to assist in passing upon the 425,000 horses and mules needed for the army. Dr. Buckingham has had experience along this line during the Spanish-American War and also served the government on the Mexican Border last summer.

—The Oregon Veterinary Medical Association held a successful two-day meeting at Salem, June 15 and 16. It was decided to hold the next meeting at Portland in conjunction with the Washington Association. Dr. S. M. Reagan was elected president and Dr. B. T. Simms, secretary-treasurer.

—Dipping cows to kill fever ticks actually increases the yield of milk, according to the U. S. Department of Agriculture. Records prove that lightly infested cows produce 18.6% less milk than free cows, while heavily infested cows produce on an average 42.4% less milk than similar cows freed from ticks.

—A circular letter announces that Philadelphia, Pa. has its "hat in the ring" for the next meeting of the A. V. M. A.

# ASSOCIATION MEETINGS

## AMERICAN VETERINARY MEDICAL ASSOCIATION

### PROGRAM OF THE FIFTY-FOURTH ANNUAL MEETING KANSAS CITY, MO., AUGUST 20-24, 1917.

Headquarters, MUELBACH HOTEL, 12th & Baltimore

Place of Meeting, KANSAS CITY VETERINARY COLLEGE, 15th & Lydia

AUGUST 17TH AND 18TH

MEETING OF THE EXECUTIVE BOARD

AUGUST 20

9:30 A. M.—Opening Exercises in the College Auditorium.

12 M.—Luncheon at the College.

1:30 P. M.—First session of the Section on Sanitary Science and Police, of the Section on Surgery and Practice and of the Association of Faculties and Examining Boards.

8:00 P. M.—Meeting of Alumni Associations.

AUGUST 21ST

9:30 A. M.—Second session of the Section on Sanitary Science and Police and of the Section on Surgery and Practice.

12 M.—Luncheon at the college.

1:30 P. M.—General Business Session including the election of officers.

8:00 P. M.—Reception at the Muelbach Hotel.

AUGUST 22ND

9:30 A. M. to 5:30 P. M.—Pathological Exhibit and Luncheon at the Armour Packing Co.'s abattoirs.

AUGUST 23RD

9:30 A. M.—Third session of the Section on Sanitary Science and Police and of the Section on Surgery and Practice, and the election of the section officers.

12 M.—Luncheon at the college.

1:30 P. M.—Joint session.

7:30 P. M.—Annual Banquet at the Muelbach Hotel.

AUGUST 24TH

9:30 A. M.—General session for unfinished business and Clinic until 4 o'clock P. M.

LITERARY PROGRAM

MONDAY, AUGUST 20, 1:30 P. M.

SECTION ON SANITARY SCIENCE AND POLICE

(Auditorium)

1. Chairman's Address, J. G. Wills, Albany, N. Y.
2. Secretary's Report, T. E. Munce, Harrisburg, Pa.
3. Advantages of Testing Pure Bred Herds, S. H. Ward, St. Paul, Minn.
4. Tuberculin Testing and Retesting, C. J. Marshall, Philadelphia, and Henry W. Turner, Pittsburgh, Pa.

5. Some of the Problems in the Control of Tuberculosis in Animals, Jacob Traum, Berkeley, Cal.
6. Tuberculosis, Channels of Infection and Localization, Charles H. Higgins, Ottawa, Canada.

   Discussion by V. A. Moore, F. Torrance, J. A. Kiernan, O. E. Dyson, A. S. Cooley, Geo. H. Hart and J. I. Gibson.

SECTION ON SURGERY AND PRACTICE

(Room "B")

1. Chairman's Address, T. H. Ferguson, Lake Geneva, Wis.
2. Secretary's Report, J. H. Blattenberg, Lima, Ohio.
3. Coital Exanthema, Hal Simpson, Dennison, Iowa.
4. Sterility in Mares, F. F. Brown, Kansas City, Mo.
5. The Abderhalden Test for Pregnancy in Animals, C. A. Zell, Chicago, Ill.
6. Mastitis, W. A. Axby, Harrison, Ohio.

TUESDAY, AUGUST 21, 9:30 A. M.

SECTION ON SANITARY SCIENCE AND POLICE

(Room "B")

1. Vesicular Stomatitis, J. R. Mohler, Washington, D. C.

   Discussion by A. W. French, Chas. G. Lamb and A. S. Anderson.
2. Anthrax Control, R. C. Reed, Baltimore, Md.

   Discussion by W. H. Dalrymple, R. P. Marsteller, E. M. Ranck and W. L. Gates.
3. Studies of an Obscure Cattle Disease in Western Nevada, W. B. Mack, Reno, Nev. Discussion by A. T. Kinsley.
4. The Cleaning and Disinfection of Live Stock Cars, S. F. Musselman, Frankfort, Ky.

   Discussion by F. Torrance, L. E. Northrup and James Fleming.
5. Some Studies on the Tuberculin Test, M. H. Reynolds, St. Paul, Minn.

SECTION ON SURGERY AND PRACTICE

(Auditorium)

1. Osteopathy in Veterinary Practice, E. A. A. Grange, Toronto, Ont.
2. Heat Stroke, Its Complications and Treatment, Reuben Hilty, Toledo, Ohio.
3. Influenza, with Special Reference to Its Most Important Complications, G. W. Dunphy, East Lansing, Mich.
4. Intussusception in Horses and Colts, J. F. DeVine, Goshen, N. Y.
5. Some Original Methods, Instruments and Operations, Wm. M. Bell, Nashville, Tenn.
6. Digestive Disorders of Cattle, D. H. Udall, Ithaca, N. Y.

THURSDAY, AUGUST 23, 9:30 A. M.

SECTION ON SANITARY SCIENCE AND POLICE

(Room "B")

1. Some Observations on Hog Cholera and the Use of Serum, C. H. Stange, Chas.Murray and C. G. Cole, Ames, Iowa.

   Discussion by J. W. Connaway, R. A. Craig and E. A. Cahill.
2. The Regulation of the Production and Sale of Veterinary Biological Products by the Bureau of Animal Industry, J. R. Mohler, A. R. Ward and H. J. Shore, Washington, D. C.

Discussion by John Reichel, Frank Breed, T. F. Krey and Geo. H. Roberts.

3. Immunization Against Blackleg, Adolph Eichhorn, Pearl River, N. Y. Discussion by R. A. Archibald and Ward Giltner.
4. Some Studies on Forage Poisoning, R. Graham, Lexington, Ky.
5. (Section will adjourn to the Auditorium to participate in the discussion on Abortion Disease.)

### SECTION ON SURGERY AND PRACTICE

(Auditorium)

1. Serum Treatment of Canine Distemper, A. Slawson, New York, N. Y.
2. Handling of Dogs in a Veterinary Practice, Arthur Trickett, Kansas City, Mo.
3. Three Stereopticon Lectures:—Diseases of the Feet, H. S. Murphey and H. E. Bemis, Ames, Iowa; Distribution of the Median Nerve and the Lameness in Horses Benefitted by Its Resection, Jos. Hughes, Chicago, Ill.; Surgical Treatment of Maxillary Actinomycosis, L. A. Wright, Columbus, Wis.
4. The Avenue of Invasion and the Behavior of Abortion Infection in the Uterine Cavity, W. L. Williams. Discussion by members of both sections.

THURSDAY, AUGUST 23, 1:30 P. M.

### JOINT SESSION

(Auditorium)

1. Unfinished discussion on Abortion Disease.
2. Symposium on Animal Parasites:
   (a) Parasites of Swine, W. Lester Hollister, Avon, Ill.
   (b) Parasites of Sheep, A. D. Knowles, Missoula, Mont.
   (c) Parasites of Cattle, Seymour Hadwen, Agassiz, B. C.
   (d) Parasites of Horses, C. P. Fitch. Ithaca, N. Y.

   General discussion on Animal Parasites opened by B. F. Kaupp and L. Enos Day.

### SECTION ON VETERINARY COLLEGES AND EXAMINING BOARDS

M. JACOB, Chairman ROBERT D. WALL, Secretary

Meeting, afternoon of August 20.

The following will constitute, in part, the program:

1. Report of the Detroit meeting, August 19, 1916.
2. Report of the Committee on Examination Questions.
3. Paper by Dr. S. Stewart.
4. Paper by Dr. M. Jacob.
5. Paper by Dr. H. E. Bemis.
6. Paper by Dr. E. L. Quitman.

There will be free discussion of the above papers and also other papers by members of the association.

### CLINIC PROGRAM

FRIDAY, AUGUST 24TH, 9:30 A. M. TO 4 P. M.

(Surgical Amphitheatre)

1. Securing Cows for Udder Operations, J. P. West, Madison ,Wis.
2. Surgical Treatment of Sterility, W. L. Williams, Ithaca, N. Y.

3. Operation for Roaring, J. W. Adams, Philadelphia, Pa.
4. Special Procedure for Sidebone, L. Hart, Chippewa Falls, Wis.
5. Hernia Operation, G. B. McKillip, Chicago, Ill.
6. Extraction of Molars Under "Nerve Blocking" Anaesthesia, H. E. Bemis, and L. A. Merillat.
7. Operation for Obstruction of the Teat, T. H. Ferguson, Lake Geneva, Wis.
8. Operation for Fistula of the Withers, H. E. Bemis, Ames, Iowa.
9. A New Operation for Recto-vaginal Fistula, R. C. Moore, St. Joseph, Mo.
10. A New Operation for Preserving the Function of the Parotid Gland in Fistula of Steno's Duct, L. A. Wright, Columbus, Wis.

Plan of Headquarters District

## SECRETARY'S OFFICE

1827 South Wabash Avenue, Chicago, Ill.

## A FEW THOUGHTS AND RECOMMENDATIONS

To improve the American Veterinary Medical Association is to improve our country and our profession as well as ourselves individually. This seems, at least, reasonable and if so it is more and more difficult to explain, as the needs of organization becomes more apparent, why so many good men are content to enjoy the fruits of our growing industry without giving a helping hand to the few loyal, public-spirited men upon whom falls the burden of doing the constructive, the protective and the educational work required to keep us a separate, recognized and useful entity among the world's vocations. It is painful, or rather shameful, to record at

this day of our history that fewer than ten per cent of the veterinarians of this country support the organization that created and now maintains a profession for them to exploit and enjoy. This is not a whine nor a whimper; it is but a cold fact for the younger generation of veterinarians to ponder over.

There is a brilliant future in this country for a well organized veterinary profession that will keep pace with the growing needs of our vast live stock interests, but there will be no place for a drifting, shiftless, half educated mob having no greater aim than self aggrandizement.

The average man is little enough inclined to even stop and inquire into the security of his position, but the down and out shirker is he who lends no support whatever to the agency through which security is maintained.

Obviously the veterinarian, like Americans in general, having found prosperity without effort, has never thought of drafting studied plans for self-preservation and is today the victim of his own indifference.

While these may seem like plainly harsh words, they are the relation of facts which confront us and which we might do worse than accept as facts to be used as a point of departure to higher heights. "It is a condition and not a theory that confronts us."

The sphere of influence covers so vast a territory that it has been impossible, without an official organ, to keep the membership posted on the association's aims and activities. The few who have found it convenient to attend the annual meetings have always been proud enough of its achievements and pleased enough with its educational features, but with nothing more than this annual inspiration to keep up enthusiasm and with this inspiration reaching only a small part of the total membership, progress in the veterinary profession in America has lagged. With a good journal as an official mouth-piece, manned with able men, ably and loyally supported by the members, the prospects for advancement are more bright during the next quarter of a century than during the past one. But those to whom the management of the association is entrusted assume a big responsibility. They have large fields to cultivate, fields containing all of the potentialities of a great and indispensable industry. It is for them to begin now to lay down the foundation for an edifice of which our successors will be proud. These men must be big enough to keep down the internal strife

that spells retrogression by being fair and just but firm in handling the questions that come before them. They must be men who by understanding the actual condition we have to meet will not thwart progress by insisting upon untimely and hasty reforms any more than by inaction.

The association besides having the full responsibility of protecting the welfare of the profession, as such, is also an incorporation engaged in a business, subject to the laws of trade and commerce. It may prosper or it may become bankrupt just like any other enterprise may do. The margin between prosperity and bankruptcy in any business is never great, with us it is something alarmingly narrow. Those who assume the responsibility of executive duty in the association have this also to ponder over. They must not enact and enforce regulations which will threaten the business feature of our enterprise. Unfortunately, we have a board of directors (Executive Board) who only meet at wide intervals and who are in no position between these intervals to participate in the management of the enterprise. They must therefore trust implicitly to the Editor and the Secretary to pilot the ship safely between the meeting dates, and while our President and the whole Budget Committee are supplied with current information about finance both from the Secretary and the Editor there is nothing in the laws of the association that compels them to do so. It is therefore evident that these officers should be wisely chosen, because bankruptcy would be our greatest disgrace.

### Presidential Appointments

Dr. Frank E. Barnes, Waxahachie, Texas, Secretary for Texas, vice J. Allen Foster, dismissed.

Dr. A. McKercher, Lansing, Michigan, Secretary for Michigan.

### Meeting of the Executive Board

The Executive Board will meet at the Muelbach Hotel, Kansas City, Friday, August 17th. The call is made at the unanimous request of the members and for the purpose of cleaning up the great volume of work it has to do previous to the opening of the meeting on the 20th instant. During past years the Executive Board (then Executive Committee) had taken but little time for deliberate action, their meetings having been held hastily between sessions, often at late hours and seldom under conditions favorable for deliberate constructive work.

Members especially interested in questions to be considered at this meeting are urged to present their arguments in person or in writing no later than August 17th. The Secretary's address between August 17th and August 25th will be No. 1336 East 15th Street, Kansas City, Mo.

The Secretary will have an office on the second floor of the college building, ably attended, for the payment of dues, the filing of applications and for taking of subscriptions to the *Journal* from non-members.

Bills for the dues of 1917 will be mailed about August 1st, together with a booklet containing a program of the meeting. Members are urged to pay their dues by mail before the date of the meeting, but will be accommodated at the meeting nevertheless. It must be remembered that there is now a constitutional provision that disfranchises members whose dues are not paid.

L. A. MERILLAT, Secretary.

## COLORADO VETERINARY MEDICAL ASSOCIATION

The semi-annual meeting of the Colorado Veterinary Medical Association which was held at the Agricultural College in Fort Collins on May 31 and June 1 was one of the most successful and largely attended ever held by this body.

The first day was given over to a business session and the reading of papers. The second day was taken up with clinic. Entertainment consisted of a banquet at the Northern Hotel on the evening of May 31, and a picnic lunch at noon on June 1.

The most important business consisted in extending an invitation to the A. V. M. A. to meet in Estes Park in 1918.

The out of state guests were Drs. H. Jensen of Kansas City, H. R. Millard and Y. R. Balmer of Cheyenne.

After the address of the President, R. H. Bird, the subject of the newer treatments for blackleg was taken up in papers by Drs. Owen Howells and O. B. Morgan. These were discussed at length by Dr. Jensen and a considerable majority of the members. It seemed to be the concensus of opinion that the liquid vaccine, germ free filtrate and blackleg serum were a considerable step in advance of the old spore vaccine.

Dr. H. E. Kingman gave his experience in the use of Dakin's solution, reporting on a considerable number of cases which had been under his charge in which treatment consisted of daily irrigations of Dakin's new antiseptic.

Dr. H. S. Eakins reported on some pharmaceutical specialties which he believed would be of value to the profession, illustrating his talk by showing samples of the preparation which he discussed.

The Rabies outbreak at Fort Lupton, Colorado, was covered in a paper by Dr. H. V. McCullah. This was especially interesting as it dealt largely with rabies among cattle. The records had been accurately kept and there was much information on the incubation period and symptoms of this disease in the bovine species.

Under the title of "A Glimpse at Opportunities" Dr. Charles G. Lamb discussed the great value that a knowledge of breeding and feeding would be to the veterinarian, illustrating his talk by detailing some examples from his experience.

"Cotton Seed Poisoning in Pigs and Calves" was discussed by Dr. A. G. Wadleigh.

The ever recurring problem of contagious abortion was reopened by Dr. I. E. Newsom who gave as his excuse for bringing it up that the Experiment Station proposed to do some work on the subject in which the local practitioners could be of assistance.

The large and varied clinic took up the time of the second day. One of the most interesting cases was that in a dairy cow which had been diagnosed as traumatic pericarditis. She was presented on the day of the meeting with a slight swelling on the brisket. After examination she was destroyed and it was found that the left lung occupied fully two-thirds of the thoracic cavity and was filled with gallons of pus. In the abscess was a nail which was evidently the cause of the trouble. The heart, while very flabby and much compressed, showed no suppurative lesions. This reminded us of a case at the same clinic two years previously in which the foreign body had penetrated the spleen instead of the pericardium as is so often the case.

Dr. A. A. Hermann, of Littleton, presented some new instruments, among which was a probang attached to a battery in such a way that the end constituted a powerful magnet. It was his idea that this might be used to withdraw nails and pieces of wire from the reticulum of cattle.

Some other cases were poll evil, suppurative metritis in the mare, and a peculiar nodular condition of the teats of cows and a mechanical injury to the loins resulting in an abscess that had penetrated the peritoneal cavity. I. E. Newsom, Secy.

## WESTERN MICHIGAN VETERINARY MEDICAL ASSOCIATION

On June 15th, 1917, The Western Michigan Veterinary Medical Association, combining the veterinarians of Ottawa, Muskegon, Kent and Allegan Counties, met at Streator's Resort, Miner Lake, Allegan, for their June session.

A fish dinner and basket-lunch were served and enjoyed by all present and an address of welcome was given by Mayor Secrist of Allegan, followed by an address by Mr. Harper, of the State Livestock Sanitary Association, and one by Dr. Hayes, of the B. A. I.

A paper by Dr. D. M. Campbell, who unfortunately could not be present, was read by the Secretary.

Five applications for membership were accepted and it was decided that the next meeting in October be a travelling clinic meeting.

The meeting adjourned at 5 o'clock and everyone went home feeling that he had had one of the best times every enjoyed.

There were about 20 veterinarians and their families present.

C. S. McGUIRE.

## SOUTHERN TIER VETERINARY MEDICAL ASSOCIATION

The third regular annual meeting of the Southern Tier Veterinary Medical Association was held in Elmira July 7, 1917.

During the morning a very interesting clinic was held at the hospital of Dr. A. J. Battin, 452 W. First Street. The cases presented were varied and interesting; operations were performed.

Dinner was had at the Hotel Rathbun following which President C. D. Pearce called the meeting to order.

A count showed 38 present.

The following program of papers was presented after which there were interesting discussions:

Forage Poisoning—Infection or Poisoning. Dr. P. J. Axtell, Binghamton.

The Stallion Registration Law. Dr. J. G. Wills, Albany.

The Technique of Douching the Uterus. Dr. W. L. Williams, Ithaca.

It was voted to send $50 from the funds of the association to the aid of the French and Belgian veterinarians.

The following resolution was adopted:

WHEREAS, The conservation of the health of domesticated animals is important at all times but especially so during the war crisis in order that the meat supply may be increased;

WHEREAS: the losses from hog cholera, contagious abortion in cattle and other infectious diseases are serious factors in diminishing the supply

RESOLVED: that the members of the Southern Tier Veterinary Medical Association do what they can in eliminating these losses by advising and urging their clients that new stock be not admitted to their herds until it is shown that they are entirely free from disease or properly immunized against hog cholera, in the case of hogs; and on the other hand, to refrain, on their own part, from placing on sale any members of their own herds which are not entirely sound and which in any way are liable to disseminate disease among other herds.

At the evening session an exceedingly interesting discussion of cases was had. This discussion was opened by Dr. D. H. Udall and participated in by nearly everyone present. It was felt that this, an innovation, was an exceedingly interesting and instructive part of the meeting.

The officers elected for the coming year were as follows: Pres., Dr. A. J. Battin, Elmira; Vice-Pres., Dr. L. S. Matthews, Cooperstown; Sec. and Treas, Dr. R. R. Birch, Ithaca. Board of Censors: Drs. E. F. Vorhis, P. J. Axtell, G. T. Stone, F. D. Fordham, D. W. Clark, W. E. Muldoon. It was voted to hold the next meeting in Owego. C. P. FITCH, Sec'y.

## CENTRAL NEW YORK VETERINARY MEDICAL ASSOCIATION

The eighth annual meeting of the Central New York Veterinary Medical Association was held at Syracuse, N. Y., June 28, 1917.

A clinic, conducted at the infirmary of Dr. H. A. Turner, occupied the attention of the members during the morning session. Ten operations were performed. Lunch was served at the infirmary during the course of the clinic.

The business session opened at 3:00 o'clock P. M. at the St. Cloud Hotel, Dr. Frank Morrow, President of the association, presiding. The following members were present: Dr. H. A. Turner, Dr. Frank Morrow, Dr. W. B. Switzer, Dr. W. L. Clark, Dr. F. E. York, Dr. C. R. Baldwin, Dr. J. A. Pendergast, Dr. W. M. Pender-

gast, Dr. J. M. Currie, Dr. J. C. Stevens, Dr. E. E. Cole, Dr. J. K. Bosshart, Dr. E. E. Dooling, Dr. W. M. Sullivan, Dr. D. O'Loughlin; visitors: Dr. A. George Tegg, Rochester, Dr. Otto Faust, Poughkeepsie.

Routine business was conducted and in addition officers were elected for the ensuing year, as follows: President, Dr. W. M. Pendergast; Vice-President, Dr. J. M. Currie; Secretary-Treasurer, Dr. W. B. Switzer. Board of Censors: Dr. H. A. Turner, Dr. A. H. Ide, Dr. W. G. Hollingworth, Dr. J. C. Stevens, Dr. W. L. Clark, Dr. E. E. Dooling.

Dr. J. K. Bosshart gave a very interesting paper on the use of Formalin in the treatment of mastitis. Dr. O'Loughlin read a reprint from the *Journal* of the American Veterinary Medical Association in which he gave an instructive account of a double fracture of the pelvis in a race horse, a case which he had met in practice.

Dr. Otto Faust of Poughkeepsie was elected to honorary membership in the association.

Pursuant to a resolution passed at a preceding meeting, the secretary announced the procuring of appropriate blanks to protect the society against possible proceedings for damages in case of injury or death of animals operated upon at the clinics.

Adjournment was taken at 5:45 P. M.

W. B. SWITZER, Secretary.

## KENTUCKY VETERINARY MEDICAL ASOCIATION

Meeting called to order at 10:30.

Invocation, Rev. W. R. Anderson, Shelbyville, Ky.

Address of welcome, Mayor Rothschilds, Shelbyville, Ky.

Address by Dr. A. J. Payne, B.A.I., Louisville, on Eradication of Hog Cholera.

Discussion by members of the profession.

Address by Dr. H. Jensen, Kansas City, on Black Leg.

We then proceeded to the Dairy Farms around Shelbyville, by automobile.

Banquet served at 6 P. M.

Services opened by Rev. Powell.

Dr. R. C. Moore, St. Joseph, Mo., Toastmaster.

Responses were made as follows:—Dr. D. C. Henewatt, B.A.I. Work; Dr. W. H. Simmons, State Meat Inspector, Progress of Pure Food Work in Kentucky; Dr. R. McNeal, Cattle Raising in South America; Dr. H. Jensen, Kentucky and Veterinarians; Dr. S. F. Musselman, K.V.M.A. Work; Dr. O. S. Crissler, K.V.M.A. Work and Live Stock; Hon. O. M. Phillips, Beef Cattle; Hon. M. O. Sullivan, Shelby County.

SECOND DAY:—General order of business, followed by addresses by, Drs. Jos. Hughes, H. Jensen, R. C. Moore, D. C. Henewatt.

Dr. Joseph Hughes on Lameness and Diagnosis; 1st, neurotomy and ring bone, 2nd, spavin, 3rd, shoulder, 4th, Laminitis and after results, 5th, nail puncture, knuckling, adhesion of tendons to navicular bone, 6th, atrophy postea spinatus muscles, 7th, wire cut on right hind leg; thickened condition, 8th, summer sore, 9th, spavin, 10th, ring bone versus contraction, 11th, brachial paralysis.—ankylosis.

AFTERNOON:—Two Cryptorchids, operated on by Dr. R. C. Moore, St. Joseph Veterinary College, assisted by Dr. A. S. Barnes and R. M. Hamilton.

Operation for contraction, by Dr. R. C. Moore, (Young mule).

Mr. Albert Catlett of Shelbyville, Ky., prepared foot for these operations.

Drs. Hamilton and Barnes placed the animal on the table.

Operation for contraction, (Mule).

Dr. R. C. Moore. Separation of both tendons, assisted by Drs. M. A. Purdy, J. K. Ditto, Allen S. Barnes and R. M. Hamilton.

Dr. Jos. Hughes talked on cases diagnosed at the morning session: 1st, Brachial Paralysis, Chalk talk, illustration of Brachial Plexus, Patient referred to Dr. Moore for operation on tendons, which had become contracted as a result of brachial paralysis; 2nd, Atrophy of postea spinatus; 3rd, Talk on suspensory ligaments, check leg, perforatus and perforans tendons, Injuries to thoroughbreds which retire them from track use; 4th, splints; 5th, buckshins; 6th, spavin.

Dr. H. Jensen, address on Contagious Abortion. Discussed by Dr. Good.

Operation of Tenotomy by Dr. Moore, assisted by Dr. Purdy.

Operation on mule. Growth above coronary band below pastern, assisted by Dr. Allen S. Barnes.

D. E. WESTMORELAND, Secretary.

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—Deaths of human beings as well as domestic animals are caused every year by cicuta or water hemlock. This plant, growing in wet places, is widely distributed. Cases of poisoning are more frequent in the spring. The root only is poisonous.

—Of the twelve candidates taking their examinations before the Veterinary Board at Charlotte, N. C., June 26, eight are reported to have passed.

—Dr. J. R. Mahaffy of Wilmington, Del., has enlisted in the Veterinary Reserve Corps and has been ordered to Washington to report for duty. It is reported that Dr. Mahaffy is the only veterinarian in Delaware who has volunteered his services.

—Second Lieutenant Hadleigh Marsh of the Veterinary Reserve Corps, formerly of Washington, D. C., is stationed at Ft. McIntosh, Laredo, Texas.

# COMMUNICATIONS

## AN OPPORTUNITY FOR VETERINARIANS

*Editor Journal of the American Veterinary Medical Association, Ithaca, N. Y.:*

*Dear Sir*: The recent announcement by the United States Government to the effect that there will shortly be a demand for federal employment of some 2500 veterinarians, distributed in the Reserve Army Veterinary Service and Bureau of Animal Industry and the indications that this demand for men trained in the veterinary profession will be even greater in the immediate future, has influenced those in authority at the Michigan Agricultural College to undertake to broaden its scope of instruction and to include work both for practicing veterinarians and students in Veterinary Medicine. While it is not intended to in any way curtail the scheduled courses for veterinary students, recent action by the State Board of Agriculture opens a way for giving a special summer school course to senior veterinary students with a view to graduating them on or about April 10, 1918, thus enabling them to complete their professional studies and be prepared for earlier entrance into the field opened by our entrance into the war. Under this plan it is proposed to begin the regular senior year work of the veterinary course on August 27th, and the college is now arranging to admit not only students from other institutions, should they desire to take up this work, but also, to make it possible for practitioners who desire to qualify for this work.

Admission into this work will be arranged under two phases. Graduates and undergraduates will be allowed to enter as members of the fourth year class if they can present the necessary educational qualifications for admission to the college and pass satisfactory examinations for all work in which they desire advanced credit, or otherwise offer certificates indicating that they have satisfactorily completed the work, in some other veterinary school whose entrance requirements and course of study are equivalent to this college. Applicants entering under this arrangement after one year of residence, and satisfactorily completing the regular senior year's work will receive the college degree.

Graduates unable to qualify as above and who desire to pursue special studies, or who wish to add to their personal knowledge will be admitted into the regular class work of the senior year or permitted to elect any other of the undergraduate subjects, which they may desire, and which are regularly taught during their period of residence. They will be given all the opportunities and facilities offered regular students insofar as these opportunities do not interfere with the instruction to the regular students. This work will be offered without any tuition to residents of Michigan other than the regular matriculation fee of five dollars ($5.00) and laboratory fees should they elect work where such fees are authorized.

The subjects that will be offered as the regular senior class work are the courses of Clinic, Parasitology, Medicine, Pathology of Infectious Diseases, Meat Inspection, Therapeutics, Special and Operative Surgery, Obstetrics and Lameness and Soundness; also underclass subjects regularly scheduled in college catalogue.

Study of the general catalog, a copy of which can be obtained upon application, will not only give the information as regards the nature of these courses, but will also enable the practitioner, who may desire to take advantage of the work, to determine in advance the date when these courses will be offered. In giving this work to veterinarians who do not enter under the regular college entrance requirements this college does not contemplate granting a degree or certificate, but contemplates giving the work entirely for the benefit that may be derived from the increased knowledge in Veterinary Science.

R. P. LYMAN.

## GOOD WILL CONTRACTS HELD VALID BY WISCONSIN COURTS

*Editor Journal of the American Veterinary Medical Association:*
*Ithaca, N. Y.*

*Dear Sir:* On March 31, 1914, Dr. William Madson, who was desirous of locating in Appleton, Wis., purchased the practice of Dr. O. N. Johnson of that city for the sum of $4500.00. Dr. Johnson had practiced there for a number of years and was quite well established but he had become interested in other lines of business and no longer cared for the ordinary life of the veterinary surgeon. So in consideration of $4500.00 he sold his veterinary practice, office fixtures, hospital and good-will to Dr. William Madson. Having decided to go out of the veterinary business, Dr. Johnson further agreed in writing that he would not again practice veterinary medicine or surgery in Appleton, or vicinity unless it would be in partnership with said Dr. Wm. Madson or to buy out the said above mentioned, Dr. Wm. Madson.

However, Dr. Johnson's visions of success in other fields did not materialize. After he was out of the veterinary business for about a year he concluded that it was not so bad after all. Somewhere he conceived the idea that such a contract as he made with Dr. Madson was invalid, and he again opened an office a couple doors from the one he had sold to Dr. Madson, and where Dr. Madson was located. Dr. Madson resorted to the courts and commenced a suit to restrain Dr. Johnson from practicing in the city of Appleton.

The Circuit Court held that the agreement was valid, and that Dr. Johnson had no right to practice or advertise himself as a veterinary surgeon in the city of Appleton or vicinity. However, Dr. Johnson was not content with this, and appealed the case to the Supreme Court of Wisconsin.

After the usual delays incident to litigation, the Supreme Court affirmed the lower court in the following decision:—

SIEBECKER JUDGE: It is well established that contracts imposing reasonable restraint upon the right to exercise ones calling, trade or profession are valid. This doctrine has been applied and upheld in this state under the varying facts and circumstances disclosed by the following cases: Fairbanks and others V. Leary, 40 Wis. 637; Washburn V. Dosch, 68 Wis. 436; Richards V. American Desk & Seating So., 87 Wis. 503; Palmer V. Toms, 96 Wis. 367; Tecktonious V. Scott, 110 Wis. 441; Cottington V. Swan, 128 Wis. 321; My Laundry Co. V. Schmeling, 129 Wis. 597.

The terms of the agreement of these parties restrains defendant from practicing his profession in "Appleton or vicinity" unless he enters into partnership with the plaintiff for that purpose or purchases plaintiff's professional business. The significance of the word "vicinity" in such contracts is to be ascertained from the intent of the parties to the contract in the light of the facts and circumstances of the transaction. Burton V. Douglas, 141 Wis. 110. It appears that the defendant reopened the practice of his profession in the city of Appleton, which is specifically forbidden by the contract. Courts have sustained as valid agreements of this kind without limitation as to time in specified localities. See agreements in restraint of trade 9 Cyc. 527, paragraph (4) and note restraints limited as to space but unlimited as to time; also 6 R. C. L. sec 205. The restraint in this agreement to the affect that defendant was not to practice his profession or calling in "Appleton or vicinity" is reasonable and valid within the doctrine adhered to in the adjudications of this and other states.

By the Court: The order appealed from is affirmed.

WM. MADSON.

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*Editor Journal of the American Veterinary Medical Association*:
*Ithaca, N. Y.*

*Dear Sir*: Will you kindly permit me (as editor of the *Veterinary Journal*) to send a message through you (the editor of the *Journal* of the American Veterinary Medical Association) to my brother members of the association to welcome them as Allies in this terrible war; and to say that the British Veterinary Profession will extend the cordial hand of welcome to an American Colleague wherever we may meet in the fight for freedom and liberty, and for the righting of the wrongs of the weaker and smaller nations who have been so ruthlessly crushed.

FREDERICK HOBDAY, F.R.C.V.S., F.R.S.E.
Major Army Veterinary Corps.
Honorary Veterinary Surgeon to His Majesty the King

## VETERINARY SOLIDARITY

The Illinois State Veterinary Medical Association by vote, agreed that those members that did not go into army service would look after the practice of those who did go, to the best of their ability. The work to be done on a "fifty-fifty" basis, and the proceeds to be turned over to any one the army veterinarian should designate. This arrangement will do much to solve one of the problems that confronts the average practitioner; and we trust other veterinary organizations will take similar action. Most veterinarians who go into the Veterinary Officers' Reserve Corps will make great sacrifices. Those who cannot serve their country in the army can do their bit by looking after the professional interests of those who do.

N. S. MAYO.

# MISCELLANEOUS

—AMERICANISM AND PRUSSIANISM. "The foundations of our national policy will be laid in the pure and immutable principles of private morality. There exists in the course of nature an indissoluble union between virtue and happiness, between duty and advantage, between honest policy and public felicity, and the propitious smiles of heaven can never be expected on a union or government that disregards the eternal rules of order and right, which heaven itself has ordained."—George Washington's First Inaugural Address.

"We are now in a state of necessity and necessity knows no law. Our troups have occupied neutral Luxemburg and perhaps already have entered Belgium territory. Gentlemen, this is a breach of international law. The wrong—I speak openly—the wrong we hereby commit we will try to make good as soon as our military aims have been attained.

"He who is menaced as we are, and is fighting for his highest possession, can only consider how he is to hack his way through."—Chancellor Bethmann-Hollweg addressing the Reichstag, August 4, 1914.

—The following officers of the Veterinary Corps have been ordered to Fort Jay for further instructions: Capt. Joseph R. Jeffries, 1st Lieutenants Richard H. Power and Jules H. Uri.

The following officers of the Veterinary Reserve Corps have been assigned to active duty and ordered to proceed as follows. Second Lieutenants L. C. Phillipus and James W. Graham to Fort

Myer; 2d Lieutenant Roy C. Smith to Fort Sam Houston; 2d Lieutenant James R. Mahaffy to Front Royal Remount Depot; 2d Lieutenant John N. Campbell to Chicago, Ill.

—VETERINARIANS NEEDED. The College of Veterinary Science of the Philippine University offers a five-year course leading to the degree of doctor in veterinary science. There are twenty scholarships created by law and one through the generosity of Ser. Mariano Limjap valued at 35 pesos monthly—($17.50).

The demand for veterinarians has never been so great as at present. The Bureau of Science of the Department of Agriculture needs the services of veterinarians at a salary of 1.800 pesos per year. The field of private practice is almost untouched. The development of the islands depends upon agriculture; agriculture depends upon the live stock industry and this depends upon the veterinarians.

Instruction in the College of Veterinary Medicine is free to residents of the Philippines. For more information address the dean of the College of Veterinary Science, Philippine University, Manila.

EL AGRICULTOR FILIPINO,
*The Philippine Agriculturist.*

—Dr. R. J. Hight, a graduate of the C. V. C. and formerly Assistant State Veterinarian of Illinois, has been appointed State Veterinarian of Arizona, with headquarters at Phoenix. Dr. Hight took charge of the office May 15th.

—The twenty-sixth annual meeting (twenty-fifth anniversary) of the Missouri Veterinary Medical Association was held at Sedalia, Mo., July 25th and 26th.

—The sixteenth annual convention of the North Dakota Veterinary Association was held July 17th and 18th at the Veterinary Building, Agricultural College, Fargo, N. D.

—Dr. O. W. Anderson has removed from Chicago, Ill. to Brunswick, Nebr.

—Dr. H. O. Mantor of the B. A. I. has been transferred from Long Beach, Cal. to Beaufort, N. C.

—Dr. O. L. Tesdal has removed from Lee, Ill. to Rochelle, Ill.

—Dr. R. S. Whitney has removed from Albany to Whallonsburg, N. Y.

—Dr. R. G. McAlister is now located at Portland, Oregon.

—Dr. J. O. F. Price has been transferred from Waterloo to Lu Verne, Ia.

—Dr. I. T. Lewis, a graduate of the Kansas City Veterinary College, has located at Charlotte, N. C.

—The fourth annual meeting of the Western Veterinary Medical Association was held at Buffalo, June 29. Papers were read by Doctors Hill of Gowanda; F. E. McClelland, Buffalo; E. Rafter, Hamburg; A. Crowforth, Lockport; F. F. Fehr. Officers were elected as follows: President, J. L. Wilder, Akron; Vice-President, W. E. Frink, Batavia; Secretary, F. F. Fehr, Buffalo.

—Carbon bisulphide is being widely exploited, under various names and exorbitant prices, to farmers as a treatment for bots and worms in horses.

—A very successful meeting of the North Carolina State Veterinary Medical Association with a full and interesting program was held at Charlotte, N. C., June 27 and 28.

—Dr. V. A. Moore of Ithaca, N. Y., is at Washington, D. C., to assist in the Army Veterinary Department.

## AN APPEAL

I'm only a cavalry charger,
  And I'm dying as fast as I can
(For my body is riddled with bullets—
  They've potted both me and my man)
And though I've no words to express it,
  I'm trying this message to tell
The kind folks who work for the Red Cross—
Oh, please help the Blue one as well!

My master was one in a thousand,
  And I loved him with all this poor heart
(For horses are built just like humans,
  Be kind to them—they'll do their part);
So please send out help for our wounded,
And give us a word in your prayers;
This isn't so strange as you'd fancy—
  The Russians do it in theirs.

I'm only a cavalry charger,
  And my eyes are becoming quite dim
(I really don't mind though I'm "done for,"
  So long as I'm going to him);
But first I would plead for my comrades,
  Who're dying and suffering too—
Oh, please help the poor wounded horses!
  I'm sure that you would—if you knew!

—*Scotts Greys.*